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A REVISION OF STILLINGIA IN THE NEW WORLD*

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Three previous treatments of the genus *Stillingia* (Baillon[1], Mueller[2], Pax & Hoffman[3]) have done much to clarify the systematics of this group. However, these studies are based upon few specimens, little distribution data, and practically no habitat information. As a result, the species have remained conglomerate or split into ill-defined groups. An examination of annotations borne by herbarium specimens demonstrates the confusion concerning the identity of any one species. Furthermore, a clear differentiation has never been made between *Stillingia* and the closely neighboring genus *Sapium*, so that specimens collected without mature fruit can be assigned to neither with certainty.

Pax and Hoffmann[3] have described twenty-six species of *Stillingia;* thirteen in North and Central America, nine in South America, three in Madagascar, and one in the Fiji Islands of the southern Pacific. The present revision undertakes to re-examine the American species with the purpose of effecting a natural organization. The standard methods of the herbarium systematist have been employed for interpretation of the species, amplified by special field studies for two of the species of the southeastern United States. A conservative concept of species is adopted, and no infra-specific entities are recognized where there are insufficient data for delimitation and description of the variants. Since none of the species of *Stillingia* are pantropic in distribution, no artificial separation is made by the omission of the species of the Eastern Hemisphere.

The great reduction of the floral organs not only in *Stillingia*, but in most genera of the Euphorbiaceae, limits the amount of emphasis which may be placed on the structures of the pistillate and staminate flowers for delimitation of the

[1]Baillon, Étud. Gén. Euphorb. 510. 1858, ex parte.
[2]Muell. Arg. in DC. Prodr. 15^2:1155. 1866.
[3]Pax & Hoffmann, in Engler, Pflanzenr. IV. Fam. 147. V:180. 1912.

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species. This condition necessitates what may seem an over-emphasis on vegetative characters and differences of habitat and distribution. However, correlation of all factors demonstrates that those characters other than of the flower are of sufficient stability to justify their use in separation of species.

History

Stillingia was named by Garden[4] in honor of Benjamin Stillingfleet, an English botanist who lived from 1702 to 1771. Endlicher[5] first placed *Stillingia* in the Euphorbiaceae as a member of the tribe Euphorbieae.

J. F. Klotzsch[6] placed the genus in the tribe Hippomaneae. His work included a study of South American representatives of several genera of Hippomaneae for which he gave a short description, usually followed by a list of species belonging to the genus. Klotzsch followed Endlicher in uniting *Sapium* and *Stillingia*, with *Sapium* as a section, maintaining *Stillingia* as the generic epithet. He gave a short description of *Stillingia*, followed by diagnoses of the sections EUSTILLINGIA and SAPIUM, but he listed no species for the genus.

Baillon's[7] systematic studies on the Euphorbiaceae employed such a broad interpretation of genera allied to *Stillingia* that most of those genera of the presently recognized tribe Hippomaneae appeared as sections of *Stillingia*. In this work, he actually made no formal transfers, but merely listed the genera under the heading *Stillingia*. He apparently realized later[8] that the names in his 'Étude Général des Euphorbiacées' were not effectively transferred to *Stillingia* and tried to correct this situation in several volumes of 'Adansonia', in which he made the formal transfers, listed the basinyms, and cited specimens for each of his entities.

Mueller[9] reseparated *Stillingia* and *Sapium*, and established *Gymnostillingia* as a separate genus, based on S. *acutifolia*. Later[10] he reduced *Sapium* to the status of section in *Excoecaria*, but maintained both *Stillingia* and *Gymnostillingia* as separate genera.

Bentham[11] placed *Gymnostillingia* without rank within the genus *Stillingia*, recognizing for the first time that the gynobase is the most important generic character. Mueller[10] had previously noted the occurrence of this structure, but failed to appreciate its importance as a linking character between *Stillingia* and *Gymnostillingia*. S. Watson[12] placed the herbaceous species of the southwestern United States and northern Mexico within the genus *Stillingia*, allied to S. *acutifolia*, but he did not definitely state whether these species should be treated as a section or as a subgenus. Pax and Hoffman[13] established a new section, LEPTO-

[4]Garden ex L. Mant. 19. 1767.
[5]Endlicher, Gen. Pl. 2:1110. 1836–1840, ex parte.
[6]Klotzsch, in Wiegm. (Erichs.) Arch. 7:187. 1841.
[7]Baillon, Étud. Gen. Euphorb. 510. 1858, ex parte.
[8]Baillon in Adansonia 1:350. 1861; 2:27. 1861; 3:162. 1862; 5:320. 1865.
[9]Muell. Arg. in Linnaea 32:87. 1863.
[10]Mueller, in DC. Prodr. 15^2:1155. 1866.
[11]Bentham in Benth. & Hook. f. Gen. Pl. 3:334. 1880.
[13]Pax and Hoffmann, in Engler, Pflanzenr. IV. Fam. 147. V:194. 1912.

STACHYAE, for these four species.

Pax and Hoffman[14] were the first to divide the tribe Hippomaneae; *Stillingia* appears as a member of the subtribe Stillingiinae. These authors have given the limits of the genus as it is known today, dividing it into six sections based largely on vegetative characters.

I have not altered the generic limits of *Stillingia* since there is no confusion with the allied genera. Within the genus, however, new subgeneric categories are employed to emphasize the relationships and differences between the speciés groups. The subgenus is used in order to demonstrate a wide morphological divergence of two large species groups, and the series is used in an effort to show that boundaries between the groups within the subgenus are not distinct, and are at best tendencies toward morphological divergences. This seems to be a more logical division than to place all of the species groups on one level (as sections), indicating nothing of the stages of differentiation on a scale above the species.

Generic Relationships

Within the tribe Hippomaneae, *Sebastiania, Excoecaria, Maprounea,* and *Sapium* are the genera which have been most frequently confused with, and seem to be the most closely related to *Stillingia.* I am not prepared to comment upon the correct phylogenetic sequence of these genera, nor upon the position of *Stillingia* with reference to them. The genus *Sapium* has the closest morphological resemblance to *Stillingia,* and there has been some confusion in the past concerning the characters which separate these two genera. In *Stillingia,* an abscission layer forms above the base of each of the cocci so that after dehiscence, a three- or two-rayed hardened portion of the pericarp remains attached to the pedicel. The hardened portion of the pericarp, called the gynobase in this study, is the most prominent distinguishing feature of *Stillingia.* None of the other genera have this structure.

It is slightly more difficult to separate *Stillingia* from *Sapium* when flowering specimens without mature fruits are available. The following list of characters will serve to differentiate the two genera with ease when all of the characters are considered together (cf. fig. 1). Any one of these may fail if taken individually:

Stillingia	*Sapium*
Pistillate Flower	
Sepals separate (except in S. *saxatilis*), or absent.	Sepals united.
Seed	
Testa hardened, smooth to rugulose, not arillate.	Testa arillate in American species.
Vegetative Characters	
Herbs, shrubs, or occasionally small trees.	Large trees, infrequently subshrubs.
Glands at base of leaf present or absent, rarely elongate, cyathiform or scutelliform, the opening of the glands wide, irregularly to regularly spaced.	Glands at base of leaf mostly present, mostly elongate, tubiform or urceolate, the opening constricted, usually opposite, more a part of the petiole than of the leaf blade.

[14] Pax and Hoffmann, loc. cit. 180. 1912.

The three remaining genera are easily distinguished from *Stillingia: Sebastiania* and *Excoecaria* by the three to several stamens of the staminate flower, pistillate flower long-pedicellate, sepals united, gynobase absent; *Maprounea* by its compact inflorescence which appears almost as a capitulum, pistillate flower long-pedicellate, without gynobase.

The following is a synopsis of *Stillingia* in the Western Hemisphere, as projected in this study.

Subg. STILLINGIA	Series OPPOSITIFOLIAE	1. S. *oppositifolia* Baill. ex Muell. Arg.
		2. S. *Bodenbenderi* (O. Ktze.) D. J. Rogers
		3. S. *peruviana* D. J. Rogers
		4. S. *sanguinolenta* Muell. Arg.
		5. S. *microsperma* Pax & Hoffm.
		6. S. *diphtherina* D. J. Rogers
		7. S. *bicarpellaris* S. Wats.
		8. S. *aquatica* Chapm.
	Series DICHOTOMAE	9. S. *Uleana* Pax & Hoffm.
		10. S. *trapezoidea* Ule
		11. S. *dichotoma* Muell. Arg.
		12. S. *saxatilis* Muell. Arg.
	Series SYLVATICAE	13. S. *salpingadenia* (Muell. Arg.) Huber
		14. S. *scutellifera* D. J. Rogers
		15. S. *Dusenii* Pax & Hoffm.
		16. S. *zelayensis* (HBK.) Muell. Arg.
		17. S. *texana* I. M. Johnst.
		18. S. *sylvatica* Garden ex L.
Subg. GYMNOSTILLINGIA	Series ACUTIFOLIAE	19. S. *acutifolia* (Benth.) Benth. ex Hemsl.
	Series TRECULIANAE	20. S. *Treculiana* (Muell. Arg.) I. M. Johnst.
		21. S. *paucidentata* S. Wats.
		22. S. *spinulosa* Torr.
		23. S. *linearifolia* S. Wats.

SYSTEMATIC CRITERIA

The genus *Stillingia* is a diverse group of perennial herbs, subshrubs, shrubs, and small trees. The tree habit is rare in the American species: S. *acutifolia*, of southern Mexico and Guatemala, and S. *oppositifolia*, of southeastern Brazil, are the only species which have sufficient height and diameter of trunk to be called trees.

Stems of the species of all series except SYLVATICAE arise directly from a tap root. Although seldom found on herbarium specimens, the woody root crown or rhizomes of species of SYLVATICAE are, nevertheless, of diagnostic value. The adventitious roots of S. *sylvatica* and S. *aquatica* are distinctive, those of the former being stoutly elongate-fusiform, arising at wide intervals along the rhizome, and those of the latter filiform and very closely set on the primary root.

The branching systems are opposite, alternate, approximate, or fascicled, the latter being a result of shortened internodes subtending the inflorescence and thus presenting a somewhat whorled appearance. The fascicled branching pattern gives the upper portions of the plant a corymbiform appearance. The bark of the

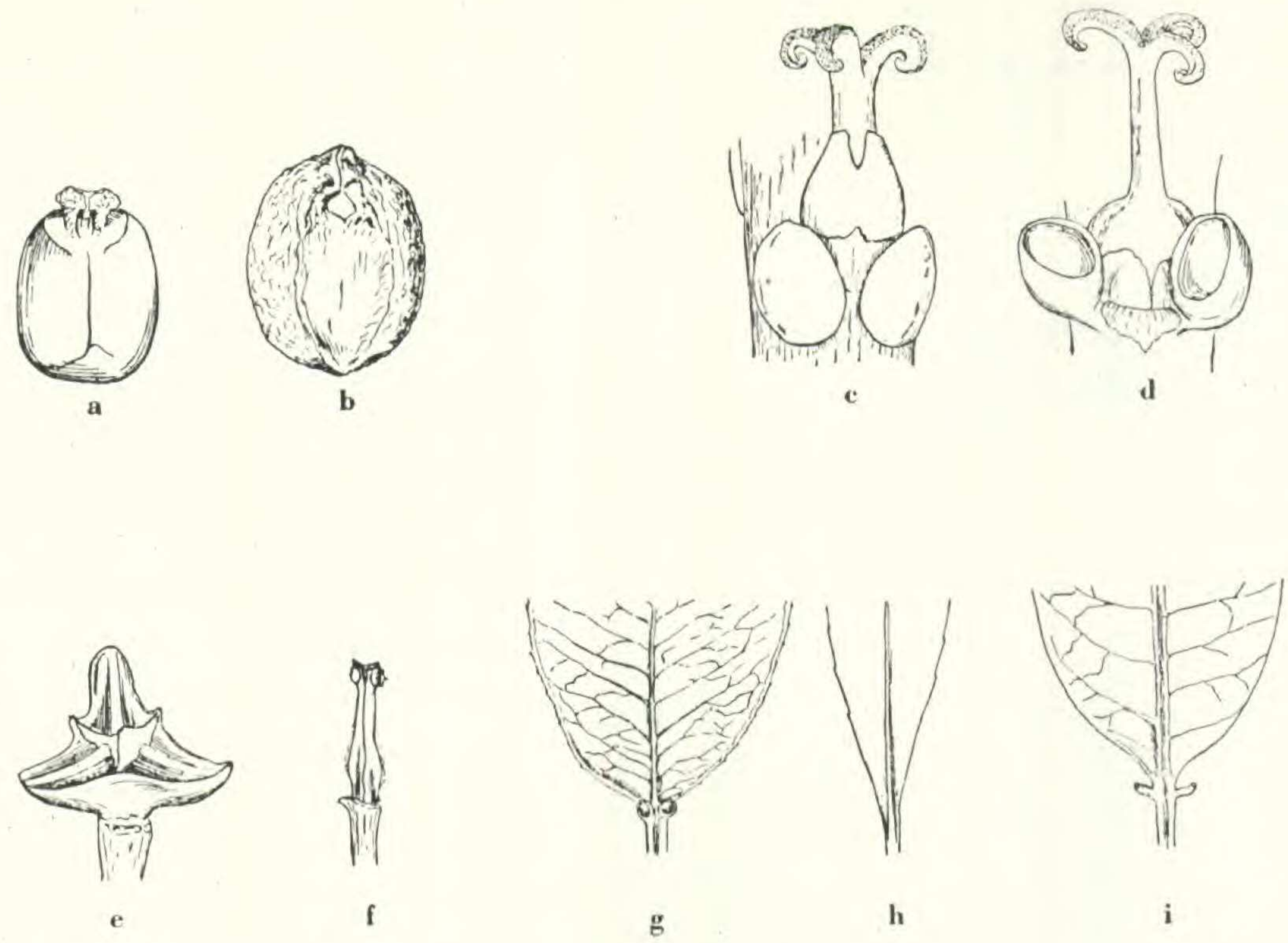

Fig. 1. Illustrations of taxonomic criteria for *Stillingia* and *Sapium*.

Seed: a—*Stillingia scutellifera*, testa hardened; b—*Sapium haematospermum*, testa arillate.

Pistillate flower: c—*Sapium marginatum*, the sepals united; d—*Stillingia salpingadenia*, the sepals separate.

Pedicel after dehiscence of fruit: e—*Stillingia sylvatica* ssp. *sylvatica*, the gynobase present; f—*Sapium sebiferum*, without gynobase.

Leaf: g—*Stillingia scutellifera*, with 2 basal scutelliform or cyathiform glands; h—*Stillingia aquatica*, without glands at base of blade; i—*Sapium pedicellatum*, with 2 basal, tubular glands.

shrubby species is lenticellate in varying degrees, with the exception of those of series DICHOTOMAE, whose succulent species have no lenticels. S. *sanguinolenta* has an unusually rough bark due to the presence of a large number of lenticels. Succulence of stem and leaf is a definitive character of the species of series DICHOTOMAE.

The leaves are widely spaced on the stem, except in S. *Bodenbenderi* and S. *peruviana*. In these species the leaves may be widely spaced but frequently they may arise in groups on peg-like short shoots. The outline, margin, venation, and texture of the leaves are important key characters. The leaves of the Mexican, Central and South American species of the subgenus STILLINGIA, with few exceptions, are provided with two to several cup- or boat-shaped glands at the base of the blade. This is not a constant feature of each leaf, but generally more than one leaf of a standard herbarium specimen will have these modified serrations. The types of leaf texture occurring in *Stillingia* are: thin to firmly membranaceous, definitely coriaceous, and succulent or fleshy. These conditions are usually characteristic of whole groups of species, but S. *diphtherina* is the only known species with coriaceous leaves.

The organization of the inflorescence, a spiciform thyrse, is essentially the same throughout the genus. The flowers are monoecious, with the pistillate flowers always solitary in the cymule, but the number of staminate flowers in a cymule varies. The pistillate flowers are attached toward the base of the peduncle and either immediately subjacent to the lowest staminate cymule or with a distinct space on the peduncle separating the pistillate and staminate cymules. The inflorescence may be pedunculate below the point of insertion of the lowest pistillate flower, or sessile.

Both the pistillate and the staminate cymules are subtended by a bract the shape of which is of some importance in species differentiation. The bracts are squamaceous in all species except S. *Dusenii,* in which the bract of the pistillate cymule seems to be somewhat foliaceous. The bracts are subtended by two patelliform, cyathiform, tubiform, or urceolate marginal glands. Generally, these glands are simple, but in S. *oppositifolia* they may be twice or three times branched. These glands are considered as homologues of the cup-shaped serrations at the base of the leaves of several species. The staminate flowers are borne in groups of 3 to 13, or singly in the axil of a bract toward the apex of the inflorescence.

This inflorescence structure is assumed to be derived from a more primitive type by reduction. The inflorescence structure of *Hevea,* for example, with several pistillate flowers on the primary and secondary axes, might represent a more primitive condition than that observed in *Stillingia* where the pistillate flowers are single in the cymules. A further reduction series is evident within the genus *Stillingia* in the staminate cymule structure. The species of subgenus Stillingia are characterized by three to many staminate flowers in each cymule, but the subgenus Gymnostillingia has only one staminate flower for each cymule.

A strengthening feature for the distinction between the two subgenera is found in the sepals of the pistillate flower. All of the species of subgenus Stillingia have three (or two in S. *bicarpellaris*) sepals which are distinct, or fused into a truncate annulus in S. *saxatilis,* and the remnants of these are occasionally apparent at the base of the gynobase even at maturity of the fruit. The name gymnostillingia is derived from the absence of a calyx, and all species of the subgenus except S. *acutifolia* are completely lacking it. S. *acutifolia* is a transitional species in this respect, with very small and fugacious sepals.

No primary systematic importance has been attached to the staminate flowers since they are rather uniform and present no readily observed differences. On the other hand, relative congestion of the staminate cymules and the total number of staminate flowers of an individual cymule are used in the diagnostic treatment. The pollen grains are spheroid or nearly so, with three pores, except in species of series dichotomae in which they are ellipsoid with one lateral pore.

The mature fruit of *Stillingia* affords the most striking feature of generic distinction, but presents few characters for species diagnosis. The gynobase (described

in the section on Generic Relationships) is a constant feature of all species of *Stillingia*. The lobe length of the mature gynobase is consistently given in the descriptions, being measured from the central column to the apex of the lobe. The variability of this character within a species prevents inclusion as a key character.

Seed size, contour, and surface are constant within the species, for the most part. Again, variation occurs notably in the extreme southeastern part of the range of S. *sylvatica* where introgression with S. *aquatica* is reflected in the variability of the seed. The presence or absence of the caruncle is one of the best supporting characters for the division of the genus *Stillingia* into two subgenera. Subgenus STILLINGIA is characterized by the presence of a well-defined caruncle in all species. Subgenus GYMNOSTILLINGIA is not completely without this body, however, and a very definite caruncle appears in S. *Treculiana*. *Stillingia acutifolia*, S. *spinulosa*, and S. *linearifolia* are ecarunculate; S. *paucidentata* is a transitional species in this respect, with a very minute and fugacious, but nevertheless definite caruncle.

Attempts to count the somatic chromosomes of S. *sylvatica* using Perry's[15] techniques were not particularly successful, but were sufficiently good to show that a number in excess of that reported by Perry ($2n = 36$) were present in the specimens examined. Since this might indicate a polyploid race within the species S. *sylvatica*, an effort to correlate pollen grain size with polyploidy was made. Although there was some variability in pollen grain dimensions, there was no indication of two different races, the range of variation being continuous.

SUBGENERIC CATEGORIES

The subgenus STILLINGIA includes those species with 3 to 13 staminate flowers in a cymule, 3 to 2 definite sepals in the pistillate flowers, and a well-defined caruncle on the seed. Species with a single staminate flower in a cymule, sepals and caruncle absent, are referred to subgenus GYMNOSTILLINGIA. There is a sufficient overlap of characters between the two subgenera, however, to prevent the establishment of distinct genera.

The series within both subgenera are divided largely on vegetative characters with only a few correlating floral characters. In subgenus STILLINGIA the first and most primitive series, OPPOSITIFOLIAE, is a group of woody shrubs or small trees with membranaceous or coriaceous leaves and spheroid pollen grains. The individual species of this series are quite distinct morphologically.

Series DICHOTOMAE, a group of four shrubby species, is characterized by mostly succulent stems and leaves, and by ellipsoid pollen grains with one pore. This interesting group is poorly known and infrequently collected. *Stillingia Uleana* seems to be the connecting species between the species of series DICHOTOMAE and those of OPPOSITIFOLIAE. Further collections from eastern Brazil, to which region this group is confined, may throw more light on the inter-relations of these species.

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[15] Perry, in Am. Jour. Bot. 30:527. 1943.

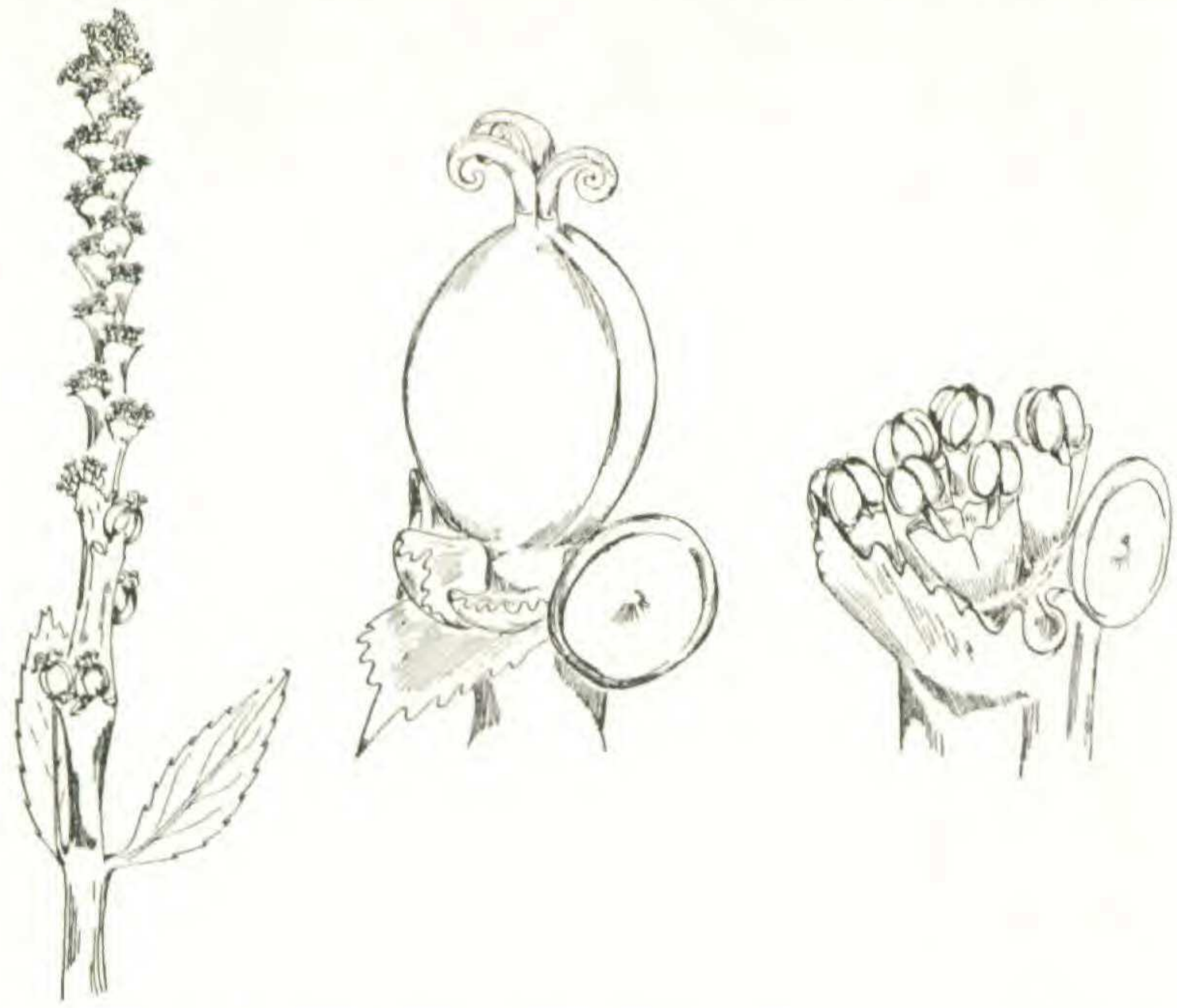

Fig. 2. Inflorescence and flower structure of *Stillingia zelayensis*, typical of subgenus STILLINGIA.

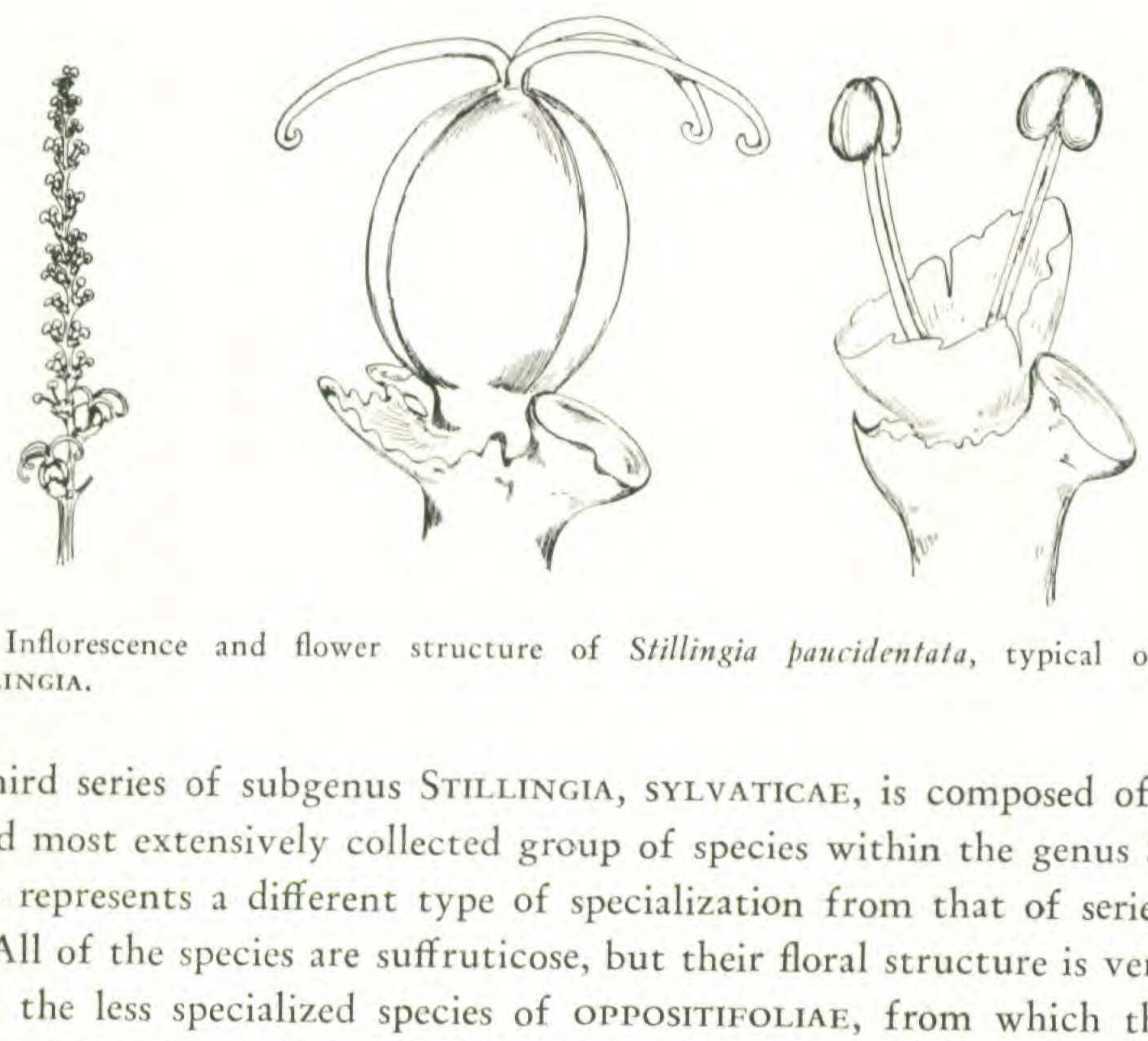

Fig. 3. Inflorescence and flower structure of *Stillingia paucidentata*, typical of subgenus GYMNOSTILLINGIA.

The third series of subgenus STILLINGIA, SYLVATICAE, is composed of the best known and most extensively collected group of species within the genus *Stillingia*. This series represents a different type of specialization from that of series DICHOTOMAE. All of the species are suffruticose, but their floral structure is very similar to that of the less specialized species of OPPOSITIFOLIAE, from which this group seems to be derived. Although the species are very closely related, they seém to have diverged and stabilized themselves sufficiently to be called species rather than subspecies of one large "cenospecies". Evidence of their close relation is seen not only in morphological characters, but also in the fact that they have apparently erected none or few genetic barriers to prevent rather free hybridization where their geographic margins overlap. Because of these putative hybrids, many names

have been applied previously without any thought as to the explanation of the phenomenon, nor of the ensuing confusion.

The three South American representatives of SYLVATICAE, S. *salpingadenia*, S. *scutellifera*, and S. *Dusenii*, are widely separated geographically from the three North American species. Although easily distinguished morphologically from S. *sylvatica* of the southern United States, S. *scutellifera* resembles the Texan representative of the former in many particulars, both ecologically and morphologically.

In only one case have I seen fit to designate a subspecies in this series, that of S. *sylvatica* ssp. *tenuis*, which occurs only in extreme southeastern Florida. Sufficient material, together with personal knowledge of the habitat through field studies, makes this possible. There seems little doubt, however, that at least one species in South America, S. *scutellifera*, has a closely related form, exemplified by *Hassler 5612* and called *saxatilis* var. *salicifolia* by Chodat and Hassler[16], which possibly could be designated as a subspecies. Lack of sufficient knowledge makes such a step premature.

There seems to be little or no genetic barrier between S. *aquatica* of Series OPPOSITIFOLIAE and S. *sylvatica* of Series SYLVATICAE. In the spring of 1950 local population samples were made at several points in Florida to determine the possibility of hybridization between such widely differentiated species. The assembled specimens were studied and indexed according to techniques used by Anderson[17]. Although larger samples would have been desirable, those actually made give rather positive evidence that free hybridization does occur.

The subgenus GYMNOSTILLINGIA is composed of two series which are widely differentiated. Series ACUTIFOLIAE has one shrubby species, S. *acutifolia*, with broad, thinly membranaceous leaves. The second series, TRECULIANAE, is a group of perennial herbs with a compact growth habit and for the most part very small, narrow leaves. There seems little doubt that the four species of this series form a natural group of plants which have become adapted to the extreme environmental conditions under which they exist.

GEOGRAPHY

In the accompanying maps (figs. 4 and 5) are shown the known areas of distribution of the species of *Stillingia* in the New World. In general, the North American material has been sufficiently ample to plot distributions with some accuracy, but there are still many gaps and disjunctions which may be filled with further collecting, particularly in Central and South America.

For the most part, the species of *Stillingia* are limited to areas of temperate or subtropical climate, those occurring closest to the equator being at higher altitudes. In South America, S. *Bodenbenderi* reaches farthest south, in the Sierra de Cordoba in Argentina; S. *sylvatica* is the most northern species in North America, reaching the 38th parallel in southern Kansas.

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[16]Chodat & Hassler, in Bull. Herb. Boiss. II, 5:676. 1905.
[17]Anderson, Edgar. Introgressive Hybridization. New York. 1949.

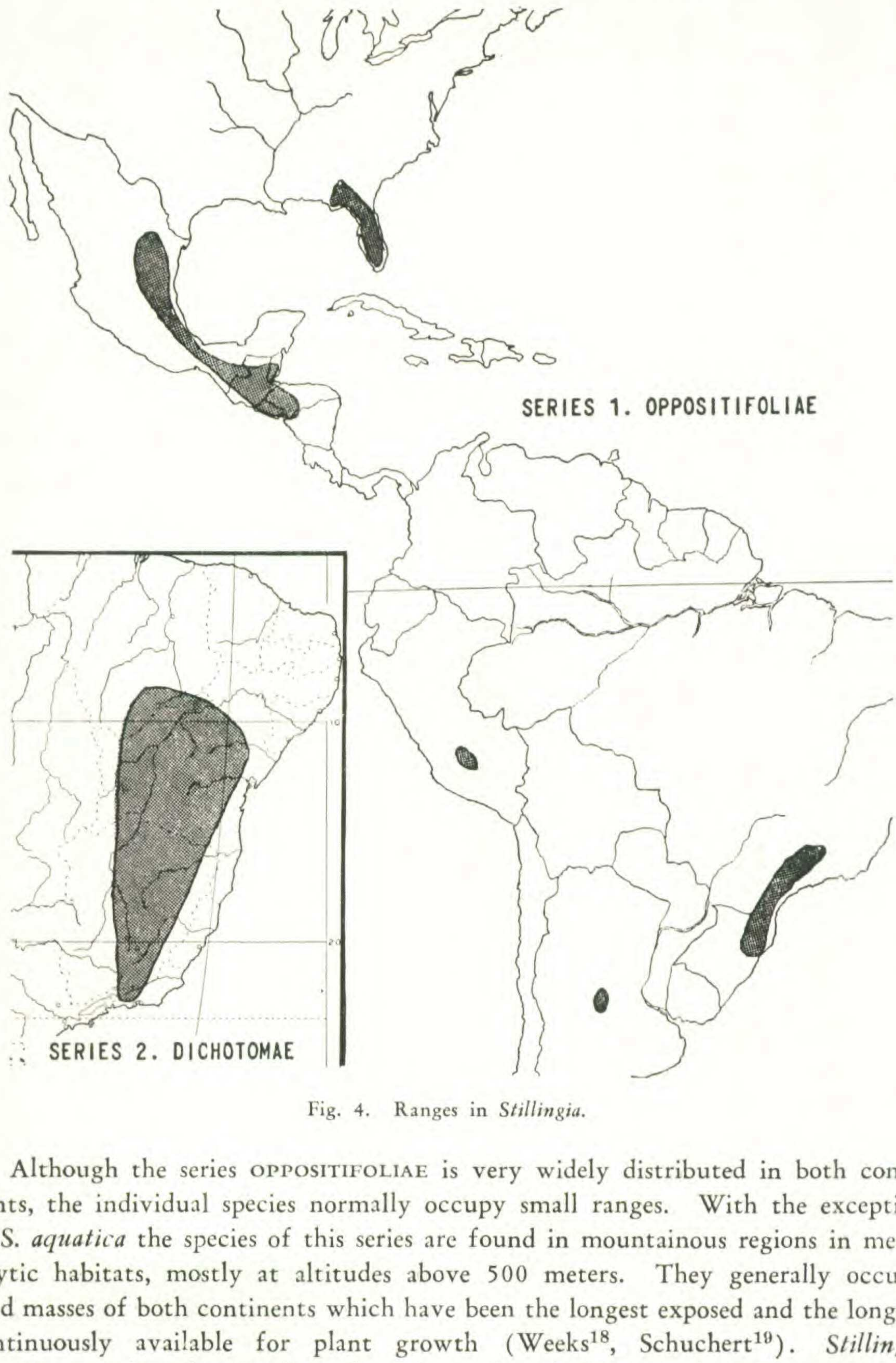

Fig. 4. Ranges in *Stillingia*.

Although the series OPPOSITIFOLIAE is very widely distributed in both continents, the individual species normally occupy small ranges. With the exception of S. *aquatica* the species of this series are found in mountainous regions in mesophytic habitats, mostly at altitudes above 500 meters. They generally occupy land masses of both continents which have been the longest exposed and the longest continuously available for plant growth (Weeks[18], Schuchert[19]). *Stillingia aquatica*, on the other hand, is the only species of the genus found in marshy or swampy habitats only a few meters above sea level in a region of relatively recent origin.

[18] Weeks, in Bull. Geol. Soc. Am. 59:249. 1948.
[19] Schuchert, Historical Geology of the Antillean-Caribbean Region. New York. 1935.

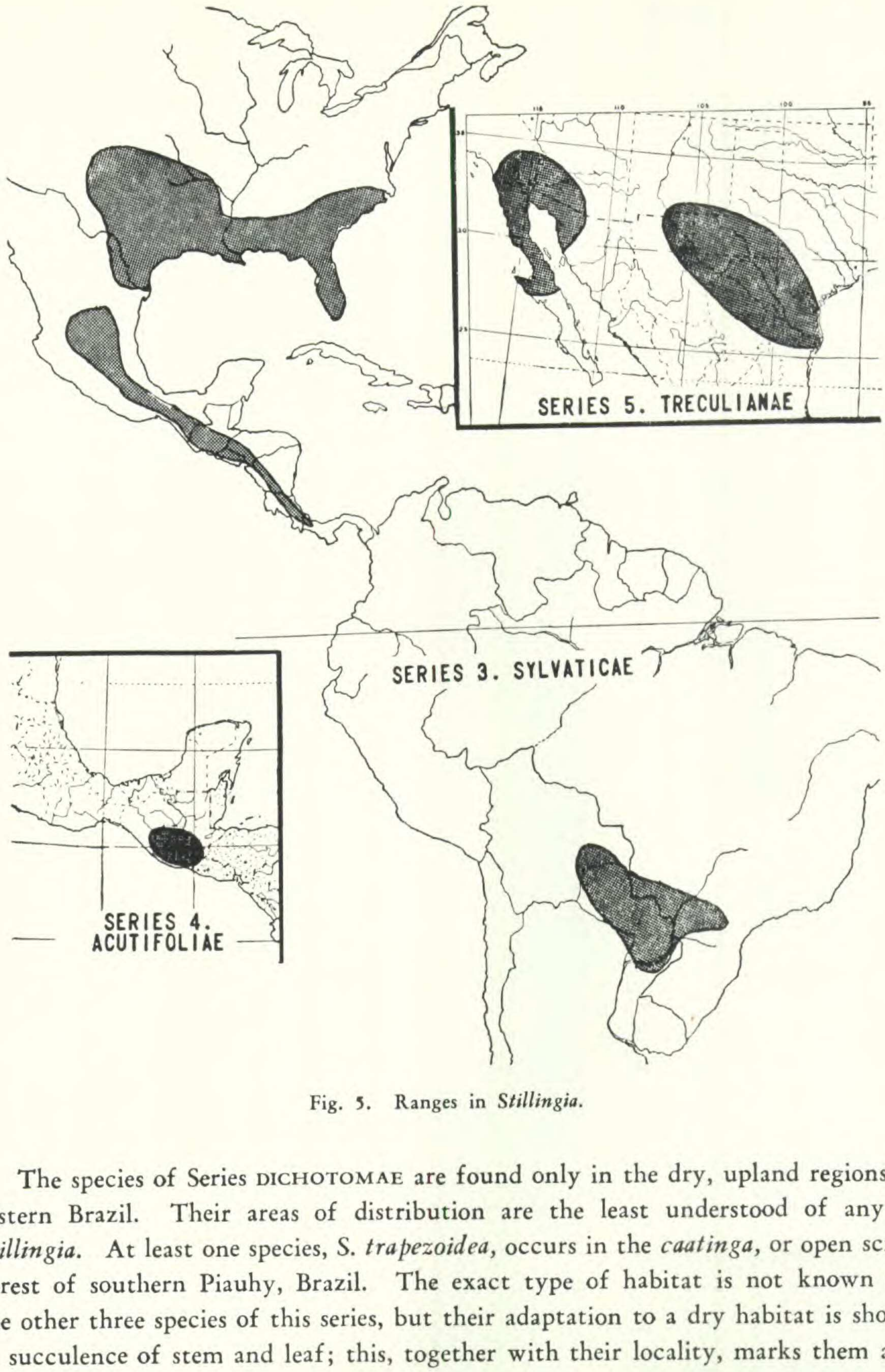

Fig. 5. Ranges in *Stillingia.*

The species of Series DICHOTOMAE are found only in the dry, upland regions of eastern Brazil. Their areas of distribution are the least understood of any in *Stillingia.* At least one species, S. *trapezoidea,* occurs in the *caatinga,* or open scrub forest of southern Piauhy, Brazil. The exact type of habitat is not known for the other three species of this series, but their adaptation to a dry habitat is shown in succulence of stem and leaf; this, together with their locality, marks them as a derived group.

With the exception of S. *zelayensis* of the Mexican and Central American highlands, species of the series SYLVATICAE are found in regions of lower elevation than

those of series OPPOSITIFOLIAE, generally from near sea level to altitudes of 300–500 m. *Stillingia zelayensis,* however, is confined to upland regions, from 1200 to 2800 m., mostly in open pine forests. The greatest distribution areas of the species of this series are in regions which were inundated by Cretaceous seas, and which today are mostly covered with open forests or savannas in North and South America.

Stillingia acutifolia, the only species of series ACUTIFOLIAE, occupies a small area in southern Mexico and Guatemala. It occurs in the mountainous regions, within a definite mesophytic habitat. The four species of series TRECULIANAE are rather narrow endemics in the arid desert or semi-desert regions of the southwestern United States and northern Mexico.

STUDY MATERIAL

The herbaria where specimens have been obtained for study, together with the symbols[20] employed in their citation, are as follows:

A—Arnold Arboretum of Harvard University, Jamaica Plain, Mass.
AN—Colegio Anchieta, Porto Alegre, Brazil.
BR—Jardin Botanique de l'État, Bruxelles.
C—Universitetes Botanisk Museum, Copenhagen.
F—Chicago Natural History Museum (Field Museum).
FLAS—Agricultural Experiment Station Herbarium, University of Florida, Gainesville.
G—Institut de Botanique Systematique de l'Université, Genève.
GH—Gray Herbarium of Harvard University, Cambridge, Mass.
K—Royal Botanic Gardens, Kew.
LIL—Instituto Miguel Lillo, Tucumán, Argentina.
MICH—University of Michigan, Ann Arbor.
MO—Missouri Botanical Garden, St. Louis.
NY—New York Botanical Garden.
OKL—Bebb Herbarium, University of Oklahoma, Norman.
P—Muséum National d'Histoire Naturelle, Paris.
S—Naturhistoriska Riksmuseet, Stockholm.
TEX—University of Texas, Austin.
UC—University of California, Berkeley.
US—United States National Herbarium, Smithsonian Institution, Washington, D. C.

I wish to acknowledge my indebtedness to the curators of these institutions, and to the Director and Staff of the Missouri Botanical Garden where this study was made.

[20] The symbols used are as suggested by Lanjouw in Chron. Bot. 5:143. 1939.

Taxonomy

STILLINGIA Garden, ex L. Mant. 19. 1767; Baillon, Étud. Gén. Euphorb. 510. 1858, ex parte; Muell. Arg. in DC. Prodr. 15^2:1155. 1866; Benth. in Benth. & Hook. f. Gen. Pl. 3:334. 1880; Pax, in Engl. & Prantl, Nat. Pflanzenf. III, 5:96. 1890; Pax & Hoffm. in Engl. Pflanzenr. IV, Fam. 147. V:180. 1912.

Seborium Raf. Sylva Tellur. 63. 1838.
Ditrisynia Raf. loc. cit. 64. 1838.

Glabrous perennial herbs, shrubs, or small trees. Leaves simple, alternate, opposite, or verticillate, usually with 2 to several filiform, glandular stipules, entire to serrate, with or without 2–3 cyathiform or scutelliform glands at base of blade, the serrations glandular or occasionally the glands in the sinuses of the serrations. Inflorescence a terminal, spiciform thyrse, the cymules bracteate, the bracts with 2 marginal glands; flowers monoecious, monochlamydeous or naked. Pistillate flowers solitary, borne toward the base of the peduncle; sepals 3, rarely 2, mostly separate, infrequently united into a truncate annulus, imbricate, or the sepals absent; ovary superior, 3- to 2-celled, a single pendulous, anatropous ovule in each cell; stigmas 3, rarely 2, recurved, more or less coalescent at the base into a single style. Staminate flowers solitary or 3–13 in a cymule, occupying the upper portion of peduncle, the 2-lobed calyx always present; stamens 2, exserted, the filaments coalescent at the base, the 2 thecae adnate, extrorse, longitudinally dehiscent; pollen spheroid to ellipsoid, with 1–3 pores, the exine reticulate, granular, or punctate. Fruit a 3- to 2-celled, dry, septicidally dehiscent capsule, the accrescent gynobase 3- to 2-lobed, hardened and persistent after dehiscence of carpels; seeds 1 in each carpel, with or without a micropylar caruncle, the embryo central, the cotyledons broad and flattened, the endosperm mealy.

Standard species: *Stillingia sylvatica* Garden, ex L. Mant. 19. 1767.

KEY TO THE SUBGENERA AND SERIES

A. Staminate flowers in clusters of 3 or more; sepals of pistillate flowers present, persistent; caruncle present..........Subgen. I. STILLINGIA (p. 220)
- B. Shrubs or small trees arising from a tap root; stems perennial, woody or succulent, older parts gray-brown and frequently somewhat blackened, lenticels frequently obvious.
  - C. Stems woody; leaves membranaceous or coriaceous; pollen spheroid, with 3 pores; tropical and subtropical Americas, exclusive of eastern and northeastern Brazil..........Ser. 1. OPPOSITIFOLIAE (p. 220)
  - CC. Stems mostly succulent; leaves succulent; pollen ellipsoid, with 1 lateral pore; eastern and northeastern Brazil..........Ser. 2. DICHOTOMAE (p. 230)
- BB. Subshrubs arising from an enlarged woody base; stems mostly annual or biennial, herbaceous or subherbaceous, green to reddish-brown, usually without lenticels..........Ser. 3. SYLVATICAE (p. 233)

AA. Staminate flowers single; sepals of pistillate flowers absent, or minute and fugacious; caruncle absent (except in S. *Treculiana* and S. *paucidentata*)..........Subgen. II. GYMNOSTILLINGIA (p. 243)
- D. Shrubs or small trees, leaves distinctly petiolate, the pinnate venation prominent; mesophytic habitats, Central America..........Ser. 4. ACUTIFOLIAE (p. 243)
- DD. Perennial herbs; leaves sessile to subsessile, the venation not prominent (except S. *spinulosa* with palmate venation); xerophytic habitats, southwestern United States and northwestern Mexico..........Ser. 5. TRECULIANAE (p. 245)

Subgenus I. STILLINGIA

§ *Eustillingia* Kl. in Wiegm. (Erichs.) Arch. 7:187. 1841; emend. Muell. Arg. in Linnaea 32:87. 1863.

Series 1. OPPOSITIFOLIAE D. J. Rogers, ser. nov.

§ *Fruticosae* Pax & Hoffm. in Engl. Pflanzenr. IV, Fam. 147, V:186. 1912.

Caules lignosi; folia membranacea vel coriacea; pollen sphaeroideum, foraminibus 3. Americae tropicae et subtropicae Brasilia orientali excepta.

KEY TO THE SPECIES

A. Leaves usually broadest at the middle or above; secondary roots widely spaced on the primary, not thickly set; seeds ellipsoid to ovoid, 3–6 mm. long, rugulose or smooth; tropical and subtropical America, exclusive of the United States, on well-drained soils.
  B. Pistils 3-carpellate; leaves narrowly to broadly elliptic; seeds relatively small, 5 mm. long or less.
    C. Inflorescence sessile below the lowest pistillate cymule, the cymules decussate; glands of pistillate bracts frequently trifurcate; leaf margins finely to coarsely serrate; branches strictly dichotomous, never fascicled; southeastern Brazil .... 1. *S. oppositifolia*
    CC. Inflorescence pedunculate below the lowest pistillate cymule, the cymules spiral; glands of pistillate bracts simple; leaf margins finely and evenly serrulate; branches not always strictly dichotomous, sometimes fascicled.
      D. Leaves arising in groups on peg-like short shoots, or alternate if solitary; South America.
        E. Leaves short-petiolate to subsessile; bracts of staminate cymules without mucro; Argentina and Brazil .... 2. *S. Bodenbenderi*
        EE. Leaves relatively long-petiolate; bracts of staminate cymules mucronulate; Peru .... 3. *S. peruviana*
      DD. Leaves solitary and opposite, arising on main axis; Mexico and Central America.
        F. Bark densely lenticellate; branches opposite or occasionally approximate, never fascicled; fruit deeply 3-lobed; Mexico .. 4. *S. sanguinolenta*
        FF. Bark sparsely lenticellate; branches frequently fascicled; fruit shallowly 3-lobed; Central America.
          G. Leaves acuminate, membranaceous, 8–13 cm. long, 2–4 cm. broad; petioles 0.5–1.0 cm. long; inflorescence crowded, the cymules congested, relatively many-flowered .... 5. *S. microsperma*
          GG. Leaves acute, coriaceous, 1.8–3.5 cm. long, 0.5–2.0 cm. broad; petioles short, 0.1–0.3 cm. long; inflorescence open, the cymules distant, relatively few-flowered .... 6. *S. diphtherina*
  BB. Pistils 2-, rarely 3-carpellate; leaves linear-lanceolate; seeds larger, 6 mm. long .... 7. *S. bicarpellaris*
AA. Leaves usually broadest toward the base; secondary roots closely set on the primary, forming a dense mat; seeds subspherical, 2–3 mm. in diameter, rugose; Georgia and Florida, in swampy places or shallow intermittent ponds .... 8. *S. aquatica*

1. STILLINGIA OPPOSITIFOLIA Baill. ex Muell. Arg. in DC. Prodr. 15^2:1160. 1866. (T.: *Sellow 4985!*).

Shrubs or small trees 1–5 m. tall; stems woody, frequently branched, the branches opposite, terete, slender, sparsely lenticellate, gray-brown, frequently somewhat blackened on older parts. Leaves decussate, widely spaced, petiolate, membranaceous, yellowish-green, elliptic or spathulate to narrowly rhombic, 3–9

cm. long, 1–5 cm. broad, apex rounded to acute or acuminate, base acute, cyathiform glands infrequent, finely to coarsely serrate, the midrib prominent, secondary venation not obvious; petiole 0.3–1.2 cm. long, sulcate above. Inflorescence 1–2 cm. long, usually sessile below the lowest pistillate cymule, the upper staminate and lower pistillate cymules decussate, crowded, distinctly separate upon the peduncle; bracts of pistillate cymule caudate-acuminate, the staminate broadly rhombic, with 3 mucros, the glands urceolate, the pistillate frequently trifurcate. Sepals of pistillate flower 3, linear-lanceolate, 2 mm. long or less; ovary sessile, 3-carpellate; styles 2–3 mm. long. Staminate cymules 3- to 5-flowered, the flowers subsessile, about 1–2 mm. long; calyx shallowly 2-lobed, the lobes entire; pollen spheroid, with 3 pores, the exine coarsely reticulate. Fruit deeply 3-lobed, about 5–6 mm. wide, the lobes of the gynobase 2–3 mm. long, seed not seen.

A common shrub in *Araucaria* woods, between 600 and 1000 m. alt., with average rainfall of 1750 to 2500 mm., 15–17° C. average temperature, with occasional snowfall and —5° C. during winter. Flowers and fruits from October to March.

BRAZIL: MINAS GERAIS: ad Lagoa Santa in silvis super rupes calcar., *Warming 1525* (C, G, GH). RIO GRANDE DO SUL: Montenegro, S. Salvador, *Friedrichs 32938* (LIL, S); San Francisco de Paula, *Rambo 2278* (LIL), *Rambo 44828, 46236* (AN); Kappesberg, pr. Montenegro, S. Salvador, in silva, *Rambo 2278* (AN, LIL), *Rambo 43828* (AN); Passo do Inferno, pr. San Francisco de Paula, *Rambo 4818, 4824* (AN); Nova Petropolis, pr. Cai, *Rambo 6575* (AN); Nonoae ad fl. Uruguay superius, ad araucarietum, *Rambo 28353* (AN, MO); Caracol, pr. Canela, *Rambo 28809* (AN); San Francisco de Paula, Vila Oliva, in silva, *Rambo 31144* (LIL); Bom Jesus, Facenda Bernardo Velho, in silva campestri, *Rambo 34775* (AN, LIL, S); Vila Oliva pr. Caxias, *Rambo 43136* (AN); Gramado, pr. Canela, *Rambo 44985* (AN). WITHOUT LOCALITY: "Brasilia meridionali", *Sellow (Sello) 4985* (G, K, P).

I am indebted to Fr. Rambo for his data on the habitat and distribution of this species.

Baillon[21] published *Stillingia oppositifolia* Kl. as a *nomen nudum,* apparently taking this name from a specimen in the Berlin Herbarium annotated *Sapium oppositifolium* by Klotzsch. In the Atlas published with his Étud. Gén. Euphorb., Baillon designates the illustrations of Plate V, figs. 24 and 25 as *Stillingia (Sapium) oppositifolia* Kl. However, in the text (p. 513) he lists S. *oppositifolium* Kl. together with ten other species in which the "S" clearly stands for *Sapium,* since the endings of the specific epithets agree with the endings of the neuter noun *Sapium* and not with the feminine *Stillingia.* Of the ten other species listed on page 513 of the text, two are designated in the Atlas as *Sapium.* Baillon's taxonomy includes all of these species under *Stillingia,* but he apparently did not make the necessary transfers in nomenclature. The name *Stillingia oppositifolia* was validated by Muell. Arg. in DC. Prodr. 15^2:1160. 1866.

[21] Baillon, Étud. Gén. Euphorb. 513. 1858.

2. STILLINGIA **Bodenbenderi** (O. Ktze.) D. J. Rogers, comb. nov.

Sapium Bodenbenderi O. Ktze. Rev. Gen. 3^2:292. 1898. (T.: *Bodenbender 6902!*).
Excoecaria Bodenbenderi (O. Ktze.) K. Schum. in Just's Bot. Jahresb. 26^1:349. 1898.
Sapium subsessile Hemsl. in Hook. Icon. Pl. *t. 2684*. 1901. (T.: *Weir 315*).

Shrubs or small trees; stems woody, frequently branched, the branches alternate, opposite or approximate, sometimes fascicled, terete, slender, moderately lenticellate, gray or slightly reddish-brown. Leaves clustered on short side branches, alternate if single, crowded, subsessile, stiffly membranaceous, elliptic to obovate, 0.8–3.0 cm. long, 0.5–1.3 cm. broad, apex acute to rounded, base acute, usually with 2 cyathiform glands, callose-serrulate, the midrib prominent, the secondary venation obscure. Inflorescence 1–2 cm. long, slightly flexuose, the peduncle elongate below the lowest pistillate cymule, the upper staminate and lower pistillate cymules spiral, widely spaced, not distinctly separate upon the peduncle; bracts of the pistillate cymule elliptic, mucronate, the staminate elliptic to ovate, rounded to acute, the glands patelliform. Sepals of pistillate flower 3, elliptic, mucronate; ovary sessile, 3-carpellate; styles unknown. Staminate cymules 5- to 9-flowered, the flowers subsessile; calyx shallowly 2-lobed, the lobes serrulate; pollen irregularly ovoid, with 3 pores, the exine reticulate to granular. Lobes of the gynobase 2–3 mm. long. Fruit and seed not seen.

ARGENTINA: CORDOBA: Sierra de Córdoba, Sept., *Bodenbender 6902* (NY, photo in F); Dept. de las Minas, Cuesta de las Chacras, Jan. 14, *Hieronymus 817* (G, NY, US).

Hemsley's failure to recognize the affinities of his *Sapium subsessile* with *Sapium Bodenbenderi* O. Ktze. probably is due to the fragmentary nature of Bodenbender's specimens. The plate of *Sapium subsessile* (in Hook. Icon. Pl. *t. 2684*. 1901), however, indicates that Hemsley's species is synonymous with *Sapium Bodenbenderi* and, furthermore, that the specimen is *Stillingia*, not *Sapium*. These drawings show a calyx of three separate sepals and a leaf base with cyathiform glands, both of which are characteristic of *Stillingia* rather than *Sapium*. In addition, the collection of Hieronymus (no. *817*), referred by Hemsley to *Sapium subsessile*, possesses a gynobase, one of the best morphological distinctions of *Stillingia*. Huber, in an appendaged note in Bull. Herb. Boiss. II, 5:452. 1906, first noted the affinities of Hemsley's species to *Stillingia*, but he did not make a formal transfer. It is difficult to understand why Pax and Hoffmann failed to make the transfer to *Stillingia*, but maintained both *Sapium Bodenbenderi* O. Ktze. and *Sapium subsessile* Hemsl.

I have not seen *Weir 315* (the specimen at Kew having been temporarily misplaced), and the wide geographic separation of this specimen (collected in the state of São Paulo, Brazil) from those of Bodenbender and Hieronymus (State of Córdoba, Argentina) is hard to explain. This may be a relict species on the old land masses of southern Brazil and in the Sierra de Córdoba, Argentina.

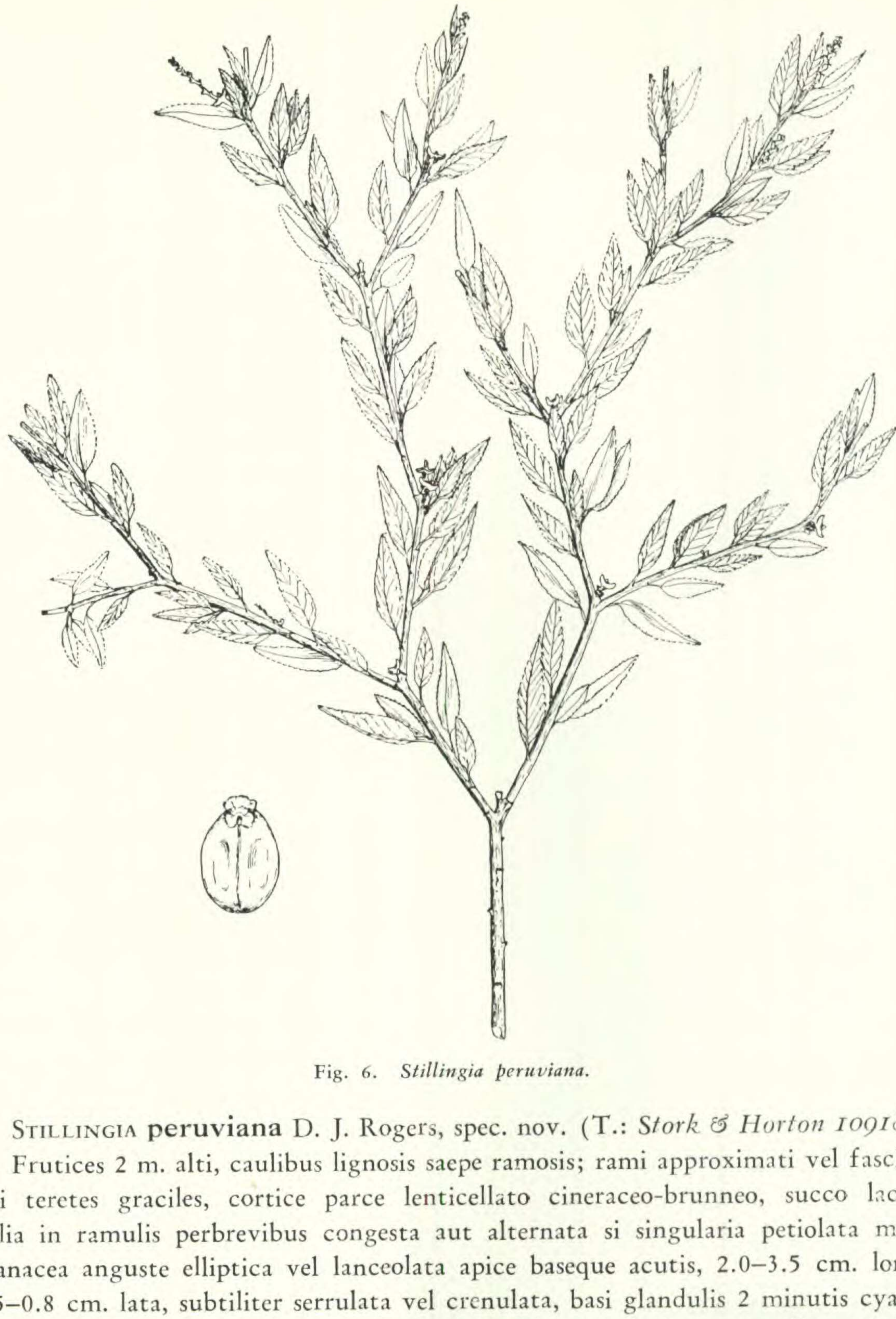

Fig. 6. *Stillingia peruviana.*

3. Stillingia **peruviana** D. J. Rogers, spec. nov. (T.: *Stork & Horton 10918!*).

Frutices 2 m. alti, caulibus lignosis saepe ramosis; rami approximati vel fasciculati teretes graciles, cortice parce lenticellato cineraceo-brunneo, succo lacteo. Folia in ramulis perbrevibus congesta aut alternata si singularia petiolata membranacea anguste elliptica vel lanceolata apice baseque acutis, 2.0–3.5 cm. longa, 0.5–0.8 cm. lata, subtiliter serrulata vel crenulata, basi glandulis 2 minutis cyathiformibus vel nullis, nervo medio prominenti venis secundariis in superficie inferiore manifestis, petiolis gracilibus 2–4 mm. longis supra sulcatis. Inflorescentia ca. 2.5 cm. longa constanter fusco-rubra sub cymula pistillata ima pedunculata, regione superiore staminali ab inferiore pistillato in pedunculo non distincte separato, cymulis pistillatis remotis staminalibus congestis, bracteae cymularum pistillatarum caudato-acuminatae marginibus saepe involutis, bracteae cymularum staminalium

late rhombeae mucronulatae, glandibus disciformibus sessilibus simplicibus. Sepala floris pistillati tria 1 mm. longa minusve. Ovarium sessile 3-carpellatum, stylis 3 mm. longis. Cymulae staminales 5- vel 7-florae; floribus subsessilibus ca. 1–2 mm. longis, calyce tenuiter 2-lobato, lobis serrulatis; pollen sphaeroideum foraminibus 3 exosporiis granularibus. Fructus profunde 3-lobatus ca. 5 mm. latus, lobis gynobasis ca. 2 mm. longis; seminibus ellipsoideis vel ovoideis ca. 3 mm. longis 2.5 mm. latis laevibus pallide brunneis, caruncula parva sub micropylo affixo.

Fairly common in shrubland along rivers at altitudes from 2500 to 2900 m. Fruit said to be edible.

PERU: HUANCAVELICA: Prov. Tayacaja, Mantaro Valley, near La Mejorada, rainy green shrubwood, Mar. 21, *Weberbauer 7605* (GH); 4 km. south of Mejorada, Mar. 14, *Stork & Horton 10918* (F, HOLOTYPE).

The nearest relatives of S. *peruviana* occur in the Sierra de Córdoba, Argentina, and in southern Mexico and Central America. In evolutionary sequence, it probably is a connecting link between the more primitive shrubby species of the mountains of southern Brazil and the more advanced shrubs of the mountains of Central America and Mexico.

The distinctive features of this species are its narrowly elliptic to lanceolate leaves, frequently grouped on short side branches, and its deep red, slender inflorescence.

Vernacular name: Cabra-cabra (Peru).

4. STILLINGIA SANGUINOLENTA Muell. Arg. in Linnaea 32:88. 1863. (T.: *Ehrenberg s. n.*).

Stillingia sanguinolenta α. lanceolata Muell. Arg. loc. cit. 1863. (T.: *ibid.*).
Stillingia sanguinolenta β. angustifolia Muell. Arg. loc. cit. 1863. (T.: *Schiede?* [*Ehrenberg*] *1245*).

Shrubs 1–3 m. tall; stems woody, frequently branched, the branches opposite to approximate, terete, slender, the lenticellate bark roughened, the sap milky. Leaves opposite, widely spaced, petiolate, membranaceous, narrowly to broadly elliptic, 1.7–8.6 cm. long, 1.0–2.6 cm. wide, apex acuminate to acute, base acute, usually with two cyathiform glands, serrulate, the midrib and secondary venation prominent; petiole 0.2–1.0 cm. long. Inflorescence 3.0–6.3 cm. long, shortly pedunculate below the lowest pistillate cymule, the upper staminate and lower pistillate cymules spiral, widely spaced, not distinctly separate upon the peduncle; bracts of the pistillate and staminate cymules cuspidate, about 1.5–2.0 mm. long, the cyathiform glands sessile. Sepals of the pistillate flower 3, cuneate, serrulate, about 2 mm. long; ovary sessile, 3-carpellate; styles 2–4 mm. long. Staminate cymules 7- to 9-flowered, the flowers subsessile, about 2 mm. long; calyx shallowly 2-lobed, the lobes serrulate; pollen ellipsoid, circular in cross-section, with 3 pores, the exine reticulate to coarsely punctate. Fruit deeply 3-lobed, 6–8 mm. wide, the lobes of the gynobase 3–4 mm. long; seeds ellipsoid, about 4.5–5.0 mm. long, 4 mm. wide, the testa slightly rugulose, the base flattened, the caruncle small.

Fig. 7. *Stillingia sanguinolenta.*

Fig. 8. *Stillingia microsperma.*

In deep leaf mold, among rocks, dense oak woods of canyon floor, openly wooded arroyos, on lower slopes, river gravel, hills, and occasionally in desert regions, at altitudes from 500 to 1000 m. Flowers from about the middle of March through June, sometimes to October, and fruits from about the first of June through the last of August.

MEXICO: TAMAULIPAS: Sierra de San Carlos, vic. of San Miguel, *Bartlett 10570* (F, US); Sierra de San Carlos, vic. of El Milagro, *Bartlett 11025* (F, GH, US). NUEVO LEON: Municipio de Villa Santiago, *Mueller 2026* (F, MICH, MO, TEX); Canyon Diente, near Monterrey, *Mueller 2668* (GH, UC); on Pan American Highway, Monterrey, *Frye & Frye 2493* (GH, MO, NY, US); Montemorelos, *Nelson 6695* (GH, US); Sierra Madre, Monterrey, *C. H. & H. T. Mueller 467* (F, TEX); Guajuco, 27 mi. s. e, of Monterrey, *E. Palmer 1255* (GH, US); hills near Monterrey, *Pringle 2070* (F, GH); river gravel near Monterrey, *Pringle 13756* (GH, MICH, US); river gravel, Monterrey, *Pringle 2534* (BR, F, GH, MO, NY, UC, US). SAN LUIS POTOSÍ: Guascama, *Purpus 4980* (F, GH, MO, UC, US); Sierra Tablon, *Purpus 5464* (F, GH, MO, NY, UC, US); Alvarez, *E. Palmer 234* (GH, NY, US). HIDALGO: Zimapán, *Kenoyer s. n.* (MICH, MO); foot of Chipique (Hidalgo?), *Kenoyer 266* (F). CHIAPAS: Comitan, *Goldman 902* (US). PUEBLA: vic. of San Luis Tultitlanapa, Puebla, near Oaxaca, *Purpus 3523* (UC). STATE AND LOCALITY UNKNOWN: *Coulter 1502* (GH); *Pavon s. n.* (D).

The identity of the collector of the type specimen of *S. sanguinolenta β. angustifolia* is doubtful. Mueller cites "*Schiede? 1245*", but Pax in Engl. Pflanzenr. IV, Fam. 147, V:191. 1912, cites *Ehrenberg 1245*, with the same locality as Mueller's. Since this specimen was in the Berlin Herbarium, it is safe to assume that Pax cited the correct collector.

Although the specimen cited by Mueller for *β. angustifolia* was unavailable, it is evident from his descriptions that the varieties are based on leaf variations. In the material available for this monograph are specimens which show that there is no definite break from the smallest to the largest leaf, and no geographical basis

for separating the varieties from the parent species. In addition, the floral structure is rather stable in all specimens examined, without sufficient evidence for maintaining any subsidiary entities.

5. STILLINGIA MICROSPERMA Pax & Hoffm. in Engl. Pflanzenr. IV, Fam. 147, V:187. 1912. (T.: *Heyde & Lux 4265!*).

Open shrubs 1.0–2.5 m. tall; stems woody, sparsely branched, the branches opposite to fascicled, terete, slender, sparsely lenticellate, the sap milky. Leaves opposite to approximate, widely spaced, petiolate, membranaceous, elliptic, 7.5–12.8 cm. long, 2.3–4.0 cm. wide, apex acuminate to acute, base broadly acute to obtuse, usually with 2 cyathiform glands, finely serrate, the midrib and secondary venation prominent; petiole 0.4–1.1 cm. long, pale green above, paler beneath. Inflorescence 3.0–8.7 cm. long, pedunculate and somewhat thickened below the lowest pistillate cymule, the upper staminate and lower pistillate cymules spiral, not distinctly separate upon the peduncle, the pistillate distant, the staminate overlapping; bracts of pistillate and staminate cymules elliptic, mucronulate, about 1.5 mm. long. Sepals of the pistillate flower 3, elliptic; ovary sessile, 3-carpellate; styles about 2 mm. long. Staminate cymules 7- to 9-flowered, the flowers subsessile, about 1.5 mm. long; calyx deeply 2-lobed, the lobes serrulate; pollen spheroid to ellipsoid, circular in cross-section, with three pores, the exine finely punctate. Fruit about 8 mm. wide, globular, not deeply 3-lobed, the lobes of the gynobase about 4 mm. long; seeds ellipsoid, about 5 mm. long, 4 mm. wide, smooth or slightly rugulose, the micropylar end slightly flattened, the caruncle small.

In open creek beds, oak woods, mountains, at altitudes from 1400 to 3000 m. on south-facing slopes, scrub-oak hillsides. Flowers from July through August, and fruits from August through November, and the first of January. Shrub said to have a disagreeable odor.

BRITISH HONDURAS: El Cayo District, in open creek bed, San Augustín, *Lundell 6740* (C, F, GH, MICH, NY, S, TEX, US).

GUATEMALA: HUEHUETENANGO: along Aguacatan road east of Huehuetenango at km. 13–14, *Standley 82033* (F); Cumbre Papal, on south-facing slopes between Cuilco and Ixmoqui, *Steyermark 50919* (F). JALAPA: La Laguna, at base of Volcan Jumay, 1 mi. north of Jalapa, *Steyermark 32291* (F); mountains along the road between Jalapa and Paraíso, *Standley 77230* (F); no locality, *Ruano 1358* (F). SANTA ROSA: Santa Rosa, *Heyde & Lux 4265* (GH, US).

6. STILLINGIA **diphtherina** D. J. Rogers, spec. nov. (T.: *Williams & Molina 10603!*).

Frutices diffusi 1–2 m. alti, caulibus lignosis saepe ramosis; rami oppositi vel fasciculati teretes graciles rigidi, cortice moderate lenticellato cineraceo saepe nigro. Folia opposita breviter petiolata lanceolata vel anguste elliptica coriacea pallide viridia, odore resinae, 1.8–3.5 cm. longa 0.6–1.8 cm. lata, apice acuto vel rotundato base anguste obtuso, margine crenulato base glandulis 2 cyathiformibus, nervio medio prominenti, venis secundariis obscuris, petiolo 1–2 mm. longo. Inflorescentia 3–5 cm. longa parce flexuosa, pedunculo elongato sub cymula pistillata ima

Fig. 9. *Stillingia diphtherina.*

aliquando crassato, cymulis superioribus staminalibus et cymulis inferioribus pistillatis spiralibus remotis; bracteae late ellipticae mucronulatae integrae, glandibus patelliformibus breviter pedicellatis. Sepala floris pistillati 3 late elliptica ca. 1 mm. longa subtiliter serrulata. Ovarium sessile 3-carpellatum, stylis ignotis. Cymulae staminales 7- vel 9-florae, tenuiter 2-lobatae lobis serrulatis; pollen sphaeroideum, foraminibus 3 exosporiis granularibus. Fructus ignotus. Lobi gynobasis 3–4 mm. longi; semina ellipsoidea vel ovoidea ca. 4 mm. longa 3 mm. lata extremo micropylari parce complanato testa laevi basi rotundata caruncula parva.

In barrancos in pine barrens, rocky limestone slopes at altitudes from 800 to 1400 m. Flowers in July, and fruits from August to the first of October.

GUATEMALA: HUEHUETENANGO: between Nenton and Las Palmas, via Yalisjao, Rincon Chiquite, Chiaquial, Guaxacana, in Sierra de los Cuchumatanes, *Steyermark 51648* (F). QUICHE: without locality, *Aguilar 760* (F), *1106* (F).

HONDURAS: MORAZAN: west of Guinope, *Williams & Molina 10603* (F, MO HOLOTYPE, UC); Tanque, *Valerio 860* (F); Zamorano, *Valerio 2158* (F); San Antonio de Oriente, *Valerio 3130* (F, MO).

This species is most closely related to S. *microsperma*, from which it may easily be distinguished by its small, leathery, short-petiolate leaves, the slender open inflorescence, and the stiff terete branches. Although none of the specimens cited have an attached fruit, it is apparent from the fragments contained in packets that the fruit is shallowly 3-lobed.

Fig. 10. *Stillingia diphtherina.*

Fig. 11. *Stillingia bicarpellaris.*

7. STILLINGIA BICARPELLARIS S. Wats. in Proc. Am. Acad. 21:455. 1886. (T.: *Pringle 128!*).

Shrubs 1.5–3.0 m. tall; stems woody, profusely branched, the branches alternate to approximate, terete, the bark slightly roughened, sparsely lenticellate, leaf scars prominent. Leaves alternate, closely spaced, shortly petiolate to subsessile, membranaceous, lanceolate to linear, 1.7–5.5 cm. long, 0.2–0.8 cm. wide, apex acute, the base acute, with occasional cyathiform glands, irregularly serrulate to entire, the midrib prominent, the secondary venation obscure; petiole about 1 mm. long. Inflorescence 1.5–2.9 cm. long, sessile below the lowest pistillate cymule, the upper staminate and lower pistillate cymules spiral, crowded, not distinctly separate upon the peduncle; bracts of pistillate and staminate cymules broadly elliptic, serrulate, mucronulate, the glands cyathiform, sessile. Sepals of pistillate flower 2, rarely 3, broadly cuneate to rhombic, serrulate; ovary sessile, 2-, rarely 3-carpellate; stigmas 2, rarely 3, style and stigma about 2–3 mm. long. Staminate cymules 6- to 7-flowered, the flowers subsessile, about 1 mm. long; calyx

deeply 2-lobed, the lobes entire, mucronulate; pollen nearly spheroid, with 3 segments, 3 pores, the exine granular to reticulate. Fruit slightly 2-, rarely 3-lobed, 6–8 mm. wide, the lobes of the gynobase 3–5 mm. long; seeds nearly spheroid, about 6 mm. long, 5.5 mm. wide, the testa smooth, shiny, the micropylar end very slightly flattened, the base rounded, the caruncle small.

Thick underbrush in woodland associations of pines, oaks, and junipers, in mountains at altitudes up to 3100 m. Flowers and fruits from the last of June through October.

MEXICO: COAHUILA: summit of Mt. Jimulco, 13 kilo. east of Jimulco, *Stanford, Retherford & Northcraft 94* (MO, NY, UC); mountains, Jimulco, *Pringle 128* (A, BR, F, GH HOLOTYPE, NY). HIDALGO: near Ixmiquilpan, *Rose, Painter & Rose 8953* (US); Ixmiquilpan, *Purpus 1454* (F, GH, MO, NY, UC). GUANAJUATO: "sur la montagne près de Guanajuato," *Duges 242* (F, US). PUEBLA: rocky places, Tehuacán, *Purpus 1320* (UC).

If the dimerous structures of the pistillate flowers of S. *bicarpellaris* were constant features, a third subgenus might well be established for this species. Since, however, both dimerous and trimerous pistillate flowers are found on the same plant, I have not considered this procedure to be advisable.

8. STILLINGIA AQUATICA Chapm. Fl. South. U. S. 405. 1865. (T.: *Chapman s. n.* lectotype, US!).

Erect shrubs 5.0–11.6 dm. tall. Primary root very short, the secondary filiform, closely set on primary, forming a dense mat. Stems single, terete, tapering gradually from the base, leafless below the branches, the bark lenticellate, light gray to brown, the wood very light, the branches fascicled or dichotomous near the apex of the main axis, the leaf scars prominent on the older branches. Leaves alternate, crowded, mostly confined to the branch apices, petiolate, membranaceous, lanceolate to linear, 3.5–8.5 cm. long, 0.4–1.7 cm. wide, apex acuminate to acute, base narrowly obtuse, without cyathiform glands, irregularly crenulate to serrulate, the midrib prominent, the secondary venation obscure; petiole 0.1–0.6 cm. long. Inflorescence 3.0–3.8 cm. long, sessile below the lowest pistillate cymule, the upper staminate and lower pistillate cymules spiral, crowded, distinctly separate upon the peduncle; bracts of pistillate and staminate cymules entire, sharply cuspidate, about 2 mm. long, the crateriform glands shortly pedicellate. Sepals of pistillate flower 3, rounded, slightly crenulate; ovary sessile, 3-carpellate; styles and stigmas about 4 mm. long. Staminate flowers 11–13 in a cymule, subsessile, about 1.0 mm. long; calyx shallowly 2-lobed, the lobes entire; pollen ellipsoid to ovoid, with 3 pores, the exine coarsely punctate. Fruit deeply 3-lobed, 5–6 mm. wide, the lobes of the gynobase 2.5–3.0 mm. long; seeds spheroid, 2–3 mm. in diameter, testa strongly rugose, the flattened micropylar end hippocrepiform, the base rounded, the caruncle small.

In shallow ponds, wet pine barrens, edges of flatwoods ponds, cypress swamps, wet sandy soils, moist ditches, in the Everglades.

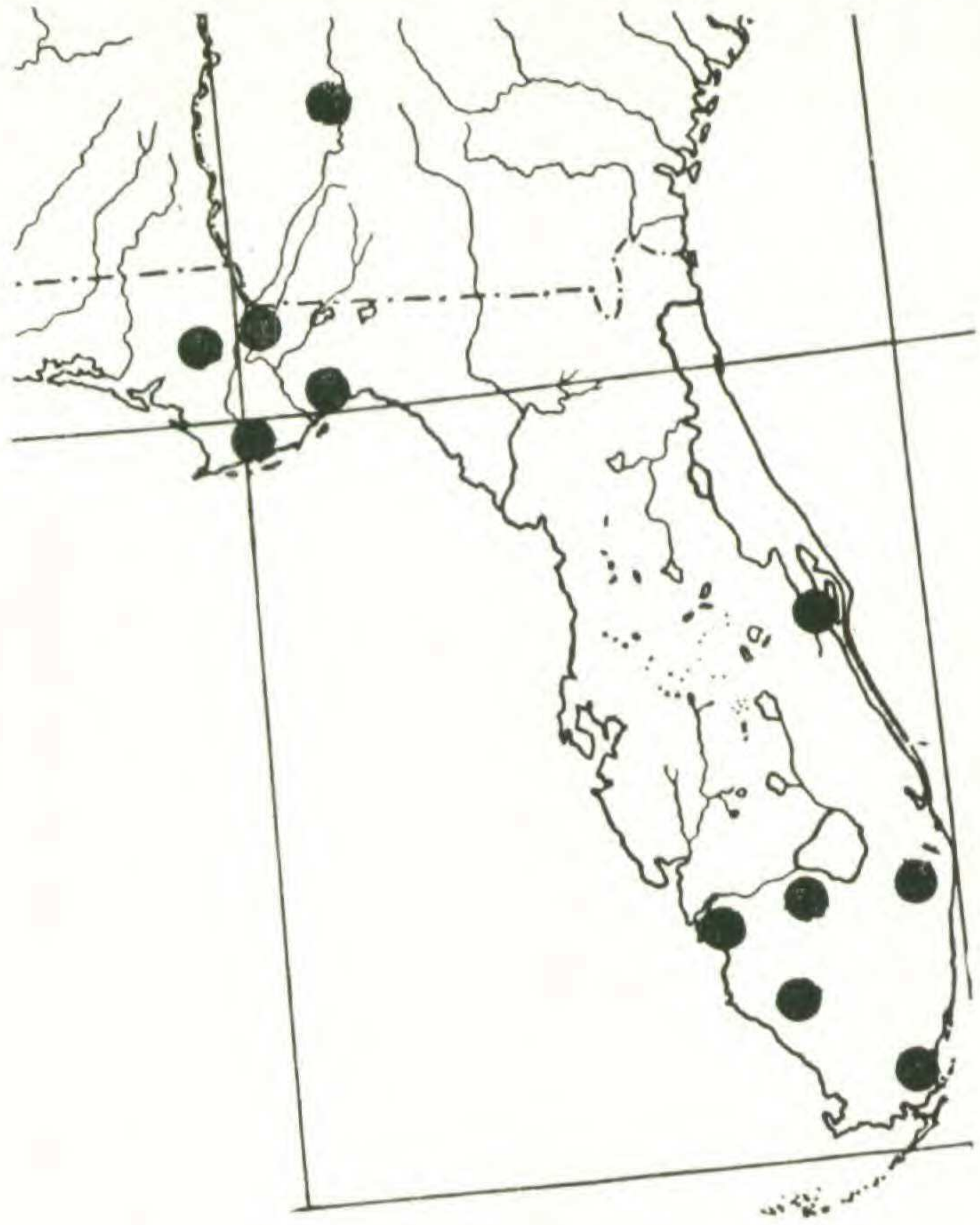

Fig. 12. *Stillingia aquatica.*

UNITED STATES: GEORGIA: Sumter Co., FLORIDA: Brevard, Collier, Dade, Franklin, Gadsden, Hendry, Lee, Palm Beach, Wakulla, and Washington counties.

No doubt many of the specimens examined from Florida are of hybrid origin, but since these specimens were not included in my study of the process of introgressive hybridization between *S. aquatica* and *S. sylvatica*, I have not indicated their hybrid nature by annotation of the specimen. The following specimens of my own collection of *S. aquatica* showing introgression with *S. sylvatica* are conserved in the herbarium of the Missouri Botanical Garden:

UNITED STATES: FLORIDA: HENDRY CO.: between LaBelle and Immokalee, in edge of cypress swamp, *Rogers 8;* near Immokalee, large population, cypress swamp, *Rogers 9.* COLLIER CO.: 3 mi. se. of Naples, *Rogers 10.* PALM BEACH CO.: 15 mi. sw. of Lake Worth in small cypress pond, *Rogers 14-2, 14-4.* MARTIN CO.: 1 mi. s. of Stuart, in cypress pond, *Rogers 15-4, 15-8, 15-9.* (See also specimen citations of *S. sylvatica* ssp. *sylvatica*, p. 241).

Vernacular name: Corkwood.

Series 2. DICHOTOMAE D. J. Rogers, ser. nov.

§ *Pachycladae* Pax & Hoffm. in Engl. Pflanzenr. IV. Fam. 147. V:186. 1912.

Frutices; caules plerumque succulenti; folia succulenta; pollen ellipsoideum, foramine uno laterali. Braziliae orientali.

KEY TO THE SPECIES

A. Stems woody, leaves crowded, spiral, with 2 cyathiform glands at the base; staminate cymules 7- to 9-flowered .... 9. *S. Uleana*

AA. Stems succulent; leaves widely spaced, or whorled when closely set,

without glands, or the glands scutelliform at base of leaf; staminate cymules 3- to 7-flowered.
B. Branches alternate or fascicled; leaves long-petiolate, mostly alternate, trapezoid........ 10. *S. trapezoidea*
BB. Branches opposite; leaves short-petiolate, opposite or verticillate, narrowly to broadly elliptic or spathulate.
C. Stems enlarged at the nodes, opaque; leaves broadly elliptic, without glands; sepals distinct........ 11. *S. dichotoma*
CC. Stems not enlarged at the nodes, vernicose; leaves narrowly elliptic to spathulate, with 2 basal scutelliform glands; sepals united into a truncate annulus........ 12. *S. saxatilis*

9. Stillingia Uleana Pax & Hoffm. in Engl. Pflanzenr. IV, Fam. 147, V:187. 1912. (T.: *Ule 7135!*).

Shrubs 2–6 m. tall; stems woody, branches infrequent, fascicled, slender, terete, sparsely lenticellate, opaque, gray-brown, frequently blackened. Leaves alternate, crowded, petiolate, succulent, elliptic to spathulate, 4–5 cm. long, 1.2–1.5 cm. broad, apex acute, base narrowly acute, crenulate, with 2 basal scutelliform glands and infrequent, irregularly spaced elongate-crateriform glands toward the tips, the midrib prominent, the secondary venation sunk in the fleshy tissue; petiole about 0.3–0.5 cm. long. Inflorescence 5–7 cm. long, slightly flexuose, pedunculate below the lowest pistillate cymule, the upper staminate and lower pistillate regions distinctly separate upon the peduncle, the cymules spiral, crowded, bracts of pistillate cymule unknown, the staminate broadly cuneate to rhombic, entire, the glands elliptic, flattened, tightly clasping the peduncle. Sepals of pistillate flower unknown; ovary sessile, 3-carpellate; styles unknown. Staminate cymules 7- to 9-flowered, the flowers subsessile, about 2–3 mm. long; calyx shallowly 2-lobed, the lobes entire; pollen grains ellipsoid, with 1 pore, the exine coarsely reticulate. Lobes of the gynobase about 3 mm. long. Fruit and seed not seen.

Brazil: bahia: Sincorá, Serra de Vendinha, 800 m., *Ule 7135* (K, photos in F, GH, MO, US).

10. Stillingia trapezoidea Ule, in Engl. Bot. Jahrb. 42:233. 1908. (T.: *Ule 7160!*).

Shrubs 1–4 m. tall; stems succulent, angular, infrequently branched, the branches alternate or fascicled, slender, sparsely lenticellate, light gray- to reddish-brown. Leaves alternate, scattered, or crowded near insertion of inflorescence, petiolate, succulent, elliptic-trapezoid, 3–4 cm. long, 1–2 cm. broad, apex abruptly acuminate, base narrowly acute, without cyathiform glands, crenulate, the midrib and secondary venation immersed in the fleshy tissue; petiole 0.5–1.0 cm. long. Inflorescence 1.2–2.0 cm. long, slender, pedunculate below the lowest pistillate cymule, the cymules spiral; bracts of the pistillate cymules broadly elliptic, mucronulate, concave, the staminate broadly caudate-acuminate; the glands elliptic, convex. Sepals of pistillate flower 3, broadly elliptic to obovate, serrulate; ovary sessile, 3-carpellate; styles 2–3 mm. long. Staminate cymules 3- to 5-flowered, the flowers subsessile; calyx 2-lobed. Fruit about 7 mm. broad, deeply 3-lobed. Seed not seen.

Details of the staminate flower have been taken from the descriptions given by Ule and Pax & Hoffmann. The specimen from Kew had no mature staminate flowers.

BRAZIL: PIAUHY: in der *catinga*[22] in der Serra Branca, Jan., 1907, *Ule 7160* (K, photos in F, GH, MO, US).

11. STILLINGIA DICHOTOMA Muell. Arg. in Linnaea 32:88. 1863. (T.: *Riedel 185!*).

Shrubs to 1 m. tall; stems succulent, thickened, enlarged at the nodes, leaf scars prominent, branches opposite, without lenticels, opaque, gray- to reddish-brown, frequently blackened. Leaves verticillate, succulent, petiolate, broadly elliptic, 5–12 cm. long, 3–5 cm. broad, apex acute to shortly acuminate, base broadly acute, without cyathiform glands, serrulate to crenulate, the midrib prominent, the secondary veins obscure; petiole 0.5–1.5 cm. long. Inflorescence 4–8 cm. long, slightly flexuose, pedunculate below the lowest pistillate cymule, the upper staminate and lower pistillate regions distinctly separate upon the peduncle, the cymules widely spaced, spiral; bracts of pistillate and staminate cymules concave, obovate, truncate, mucronulate; the glands patelliform, somewhat auriculate. Sepals of pistillate flowers 3, about 2 mm. long; ovary pedicellate, exserted beyond the bract and sepals, 3-carpellate; styles about 3 mm. long. Staminate cymules 10- to 12-flowered, the flowers subsessile, about 1.5–2.0 mm. long; calyx shallowly 2-lobed, the lobes serrulate; pollen ellipsoid, triangular in cross-section, with 1 lateral pore, the exine finely to coarsely punctate. Fruit deeply 3-lobed; lobes of the gynobase about 3 mm. long; seeds ovoid to slightly ellipsoid, about 4 mm. long, 3.5 mm. wide, tuberculate-striate, gray-brown, the caruncle small.

BRAZIL: RIO DE JANEIRO: Forterepe du Pic de Sta. Crus près de Rio de Janeiro, *Glaziou 6126* (C, G, S); in montosis saxosis prope Rio de Janeiro, *Riedel 185* (C, F, G HOLOTYPE, GH, NY).

12. STILLINGIA SAXATILIS Muell. Arg. in Mart. Fl. Bras. 11^2:539. 1874. (T.: *Riedel 1172!*).

Gymnostillingia loranthacea Muell. Arg. in Mart. Fl. Bras. 11^2:541. 1874. (T.: *Blanchet 271!*).

Stillingia loranthacea (Muell. Arg.) Pax & Hoffm. in Engl. Pflanzenr. IV. Fam. 147. V:185. 1912.

Shrubs to 1.2 m. tall; stems succulent, infrequently branched, the branches opposite, thickened, leaf scars prominent, without lenticels, vernicose, red-brown to frequently blackened. Leaves alternate, crowded, sessile to petiolate, somewhat succulent, elliptic to spathulate or oblanceolate, 3–6 cm. long, 0.8–2.3 cm. broad, apex acute to acuminate, base narrowly acute with 2 suborbicular inset glands, irregularly serrulate to serrate, with frequent irregularly spaced scutelliform glands toward the tip, the midrib prominent, secondary venation immersed in the fleshy

[22] "Catinga" refers to a region of open scrub forest, with mostly deciduous species and very low rainfall.

tissue; sessile or the petiole 0.1–0.8 cm. long. Inflorescence 2.5–6.4 cm. long, slightly flexuose, pedunculate below the lowest pistillate cymule, the upper staminate and lower pistillate regions distinctly separate upon the peduncle, the cymules widely spaced, spiral; bracts of pistillate and staminate cymules concave, obovate, truncate, mucronulate, the glands flattened, auriculate. Sepals of pistillate flower united into a truncate annulus, or greatly reduced; ovary subsessile, 3-carpellate; styles about 3 mm. long. Staminate cymules 5- to 7-flowered, the flowers subsessile, about 1.5 mm. long; calyx very shallowly 2-lobed, the lobes unevenly serrulate; pollen ellipsoid, with one lateral pore, the exine granular. Fruit deeply 3-lobed; lobes of the gynobase 3–4 mm. long; seeds ellipsoid, about 3.5 mm. long, 2.5 mm. wide, smooth, brown, the caruncle small.

In rocky, hilly areas. Flowers and fruits from October through January.

BRAZIL: BAHIA: *Blanchet 271* (G, photos F, MO); Serra das Almas, 1700 m., *Luetzelburg 172* (NY). MINAS GERAIS: Serra da Lapa, *Riedel 1172* (G, photos F, MO); Municipio Diamantina, Bom Successo, *Barreto 9675* (F). WITHOUT LOCALITY: *Glaziou 19852* (C).

The only known specimen of S. *loranthacea, Blanchet 271*, is a mere fragment on which no pistillate flowers are present. However, the great similarity of vegetative and floral characters, including the morphology of the pollen grain, leads me to the conclusion that the Blanchet specimen is but a variant of the species S. *saxatilis*.

Series 3. SYLVATICAE (Pax & Hoffm.) D. J. Rogers, stat. nov.

§ *Sylvaticae* Pax & Hoffm. in Engl. Pflanzenr. IV. Fam. 147. V:191. 1912.

Subshrubs arising from a woody underground base; stems herbaceous or subherbaceous, green to reddish-brown, without lenticels.

KEY TO THE SPECIES AND SUBSPECIES

A. Glands of the subtending bracts of the cymules elongate, tubiform or urceolate; leaf margins with a broad callus; Paraguay, Argentina and Bolivia.
  B. Leaves generally narrowly elliptic to linear, without glands at base of the blade; pistillate bracts broadly rhombic; caruncle hippocrepiform, attached below the micropyle .... 13. S. *salpingadenia*
  BB. Leaves generally elliptic to broadly elliptic, with 2 scutelliform or cyathiform glands at base of the blade; pistillate bracts elliptic to obovate; caruncle rhombic, surrounding the micropyle .... 14. S. *scutellifera*
AA. Glands of the subtending bracts of the cymules flattened, disciform, patelliform or cyathiform; leaf margins with a narrow callus or only the serrulations callose; Brazil, Mexico, Central and North America.
  C. Inflorescence pedunculate below the lowest pistillate cymule; leaves usually with 2 or more cyathiform glands at base of blade, narrowly callose, serrulate; Brazil, Central America and Mexico.
    D. Leaves sessile, usually 2 cm. long or less; staminate cymules 10- to 12-flowered, the flowers pedicellate; Brazil .... 15. S. *Dusenii*
    DD. Leaves petiolate, usually 3 cm. long or longer; staminate cymules 3- to 5-flowered, the flowers subsessile; Mexico and Central America .... 16. S. *zelayensis*
  CC. Inflorescence sessile below the lowest pistillate cymule; leaves without glands at base of the blade; United States and extreme northeastern Mexico.

E. Leaves linear; seeds truncate at base; secondary roots fibriform; southern Oklahoma, through central Texas to northeastern Mexico, in limestone soils .... 17. *S. texana*

EE. Leaves elliptic, or spathulate to obovate (except ssp. *tenuis*, with very narrowly elliptic to linear leaves); seeds rounded at the base; secondary roots fusiform; southern Virginia to Florida to Texas and New Mexico, mostly on sands .... 18. *S. sylvatica*

F. Leaves elliptic, spathulate or obovate; southern Virginia to Florida to Texas and New Mexico, exclusive of extreme southeastern Florida, in sands .... 18a. *S. sylvatica* ssp. *sylvatica*

FF. Leaves very narrowly elliptic to linear; extreme southeastern Florida, on limestone outcrops .... 18b. *S. sylvatica* ssp. *tenuis*

13. Stillingia salpingadenia (Muell. Arg.) Huber, in Bull. Herb. Boiss. II, 6:452. 1906.

Sapium salpingadenium Muell. Arg. in Linnaea 32:121. 1863. (T.: *D'Orbigny 918!*).
Excoecaria salpingadenia (Muell. Arg.) Muell. Arg. in DC. Prodr. 15^2:1209. 1866.
Sapium haematospermum sensu Chodat, in Bull. Herb. Boiss. II, 1:399. 1901, non Muell. Arg. in Linnaea 34:217. 1865.
Sapium cupuliferum Hemsl. in Hook. Icon. Pl. 28:*t. 2679*. 1901. (T.: *Hagenbeck s. n.*).
Sapium salpingadenium Muell. Arg. var. *salicina* Chodat & Hassler, in Bull. Herb. Boiss. II, 5:677. 1905. (T.: *Hassler 6346!*).
Stillingia salpingadenia (Muell. Arg.) Huber, ssp. *anadena* Pax & Hoffm. in Engl. Pflanzenr. IV. Fam. 147. V:190. 1912. (No type cited).
Stillingia salpingadenia ssp. *anadena* var. δ. *cupulifera* (Hemsl.) Pax & Hoffm. loc. cit. 1912.
Stillingia salpingadenia ssp. *anadena* var. ε. *salicina* (Chodat & Hassler) Pax & Hoffm. loc cit. 1912.

Subshrubs 3–10 dm. tall; stems subherbaceous, woody toward the base, infrequently branched, the branches alternate to approximate, leaf scars on older parts prominent, sparsely lenticellate to elenticellate, reddish- to gray-brown. Leaves alternate to approximate, subsessile to petiolate, membranaceous, narrowly elliptic to slightly lanceolate, 4–7 cm. long, 0.8–2.5 cm. broad, apex acuminate, mucronulate, base acute, without cyathiform or scutelliform glands, the margin serrulate, broadly callose, the midrib prominent, secondary venation obvious, not prominent; petiole 0.1–0.4 cm. long. Inflorescence 3.5–8.5 cm. long, sessile or shortly pedunculate below the lowest pistillate cymule, the upper staminate and lower pistillate cymules spiral, not distinctly separate upon the peduncle, the pistillate cymules widely spaced, the staminate crowded; bracts of pistillate and staminate cymules broadly rhombic, mucronulate, the glands tubiform to urceolate, about 2.5 mm. long. Sepals of pistillate flower 3, elliptic, mucronulate; ovary sessile, 3-carpellate; styles about 4–5 mm. long. Staminate cymules 7- to 9-flowered, the flowers subsessile, about 2 mm. long; calyx shallowly 2-lobed, the lobes entire to slightly serrulate; pollen ovoid to ellipsoid, with 3 pores, the exine unevenly striate to granular. Fruit not seen. Lobes of the gynobase 3–4 mm. long; seeds ellipsoid, 6 mm. long, 4.5 mm. wide, slightly rugulose, light gray, the caruncle small, hippocrepiform, attached below the micropyle.

In rocky areas, hill regions, high plains above flowing rivers, generally below 1000 m. alt. Flowers from September through December and fruits from October through February.

BOLIVIA: SANTA CRUZ: Chiquitos, *D'Orbigny 918* (F, P, photos F, US).

PARAGUAY: Cordillera de Altos, *Fiebrig 99b* (A, F, G, GH, LIL), same locality, *Hassler 2110* (G) (fasciated), *Hassler 3394* (A, F, G); Fort Lopez, *Hassler 888* (G); Cerros de Tobaty, *Hassler 6346* (A, F, G, K); in regione cursus superioris fluminis Apa, *Hassler 7782* (G).

14. STILLINGIA **scutellifera** D. J. Rogers, nom. nov.

Stillingia saxatilis sensu Chodat & Hassler, in Bull. Herb. Boiss. II, 5:676. 1905, non Muell. Arg. in Mart. Fl. Bras. 11²:539. 1874.

Stillingia saxatilis var. *salicifolia* Chodat & Hassler, loc. cit. 1905. (T.: *Hassler 4360!*), non *S. salicifolia* (Torr.) Raf.

Stillingia saxatilis var. *salicifolia* f. *latior* Chodat & Hassler, loc. cit. 1905. (T.: *ibid.*).

Stillingia saxatilis var. *salicifolia* f. *angustior* Chodat & Hassler, loc. cit. 1905. (T.: *Hassler 4424*).

Stillingia saxatilis var. *grandifolia* Chodat & Hassler, loc. cit. 1905. (T.: *Hassler 4794!*).

Stillingia salpingadenia (Muell. Arg.) Huber ssp. *saxatilis* (Chodat & Hassler) Pax & Hoffm. in Engl. Pflanzenr. IV. Fam. 147. V:189. 1912.

Stillingia salpingadenia ssp. *saxatilis* var. α. *elliptica* Pax & Hoffm. loc. cit. 1912. (T.: *Hassler 6790!*).

Stillingia salpingadenia ssp. *saxatilis* var. β. *grandifolia* (Chodat & Hassler) Pax & Hoffm., loc. cit. 190. 1912.

Stillingia salpingadenia ssp. *saxatilis* var. γ. *angustior* (Chodat & Hassler) Pax & Hoffm., loc. cit. 1912.

Subshrubs 3–7 dm. tall; stems herbaceous, arising from a perennial, woody underground base, single or several together, unbranched, or, if branched, the branches alternate to fascicled, leafy to the base, without lenticels, red-brown. Leaves alternate to approximate, subsessile to shortly petiolate, stiffly membranaceous, broadly to narrowly elliptic, 3–8 cm. long, 1–3 cm. broad, apex acute, mucronulate, base acute, with 2 scutelliform or cyathiform glands, the margin serrulate, broadly callose, the midrib and secondary venation prominent; petiole 0.1–0.7 cm. long. Inflorescence 2.8–11.8 cm. long, sessile to shortly pedunculate below the lowest pistillate cymule, the upper staminate and lower pistillate cymules relatively widely spaced, the staminate crowded, bracts of pistillate and staminate cymules elliptic to broadly rhombic, serrulate, sharply mucronulate, the glands infundibuliform, 2–3 mm. long. Sepals of pistillate flower 3, rhombic, serrulate, bluntly mucronulate; ovary subsessile, 3-carpellate; styles about 3–5 mm. long. Staminate cymules 3- to 5-flowered, the flowers shortly pedicellate, about 3 mm. long; calyx deeply 2-lobed, the lobes serrulate; pollen spheroid with 3 pores, the exine granular. Fruit not seen. Lobes of the gynobase 4–5 mm. long; seeds ovoid to slightly ellipsoid, about 5 mm. long, 5 mm. wide, slightly rugulose to smooth, dark gray, the caruncle large, waxy, rhombic, surrounding the micropyle.

Grassy campos, near margins of forest, high campos, in river regions at altitudes usually below 500 m., but occasionally to 1000 m. Flowers from October to February and fruits from November through March.

ARGENTINA: MISIONES: Dept. Cainqua, Campo Grande, *Pierotti 5365* (LIL), *5384* (LIL); Dept. Candelaria, Santa Ana, *Schwarz 3520* (LIL); Dept. San Ignacio, El Destierro, *Schwarz 1354* (LIL); Zob. Roca, *Schwarz 5195* (LIL); Santa Maria, *Schwarz 2518* (LIL); Mariá Antonia, *Schwarz 8391* (LIL); Posadas, *Ekman 506* (S, US).

PARAGUAY: Pirayu, *Balansa 1708* (K); Gtangu, près de Villa-Rica, dans les prairies, *Balansa 1711* (G); Cordillera de Altos, *Fiebrig 99a* (A); Dept. Piribebuy, Colonia Pedro P. Caballero, *Rojas A956?* (LIL); Villa Rica, *Jörgensen 3985* (A, C, F, LIL, MO, S, US); Sierra de Maracayu, in regione fluminis Tapiraguay, *Hassler 4360* (F, GH, S); in regione fluminis Capibary, *Hassler 4446* (G, S); in regione fluminis Corrientes, *Hassler 4494* (G); in regione vicine "Igatimi", *Hassler 4794* (G), *5612* (G); Cordillera Centralis, in regione cursus superioris fluminis Y-aca, *Hassler 6790* (G); in campo montano pro. Cholola (Chulolo), *Hassler 6790* (G); auf nasse Stellen, Arecipe, Rio Apa, *Anisits 2435* (S).

There is little doubt in my mind that S. *scutellifera* is sufficiently distinct from S. *salpingadenia* to be considered as a separate species. It is apparent, however, that rather free hybridization is taking place between the two species, with the result of confusion when an effort is made to key some of the individuals of either species.

15. STILLINGIA DUSENII Pax & Hoffm. in Engl. Pflanzenr. IV, Fam. 147, XVII:202. 1924. (T.: *Dusén 10440!*).

Subshrubs 1–3 dm. tall; stems herbaceous, arising from a perennial, woody, underground base, single or several together, unbranched, or, if branched, the branches alternate to fascicled, leafy to the base, without lenticels, red-brown. Leaves alternate to approximate, widely to closely set, sessile, membranaceous, ovate to elliptic, 1.0–2.5 cm. long, 0.5–1.3 cm. broad, apex acute to rounded, base obtuse to broadly acute, with 2 cyathiform to patelliform glands, the margin serrulate, narrowly callose, the midrib prominent, the secondary venation obscure. Inflorescence 8–12 cm. long, pedunculate below the lowest pistillate cymule, the upper staminate and lower pistillate regions spiral, distinctly separate upon the peduncle, the cymules relatively widely spaced; bracts of the pistillate cymules foliaceous, linear, about 5 mm. long, acute, the base auriculate, serrulate, the staminate squamaceous, ovate to broadly elliptic, serrulate, mucronulate, the glands circular, flattened. Sepals of pistillate flower 3, broadly triangular, serrulate, without mucro; ovary sessile, 3-carpellate; styles unknown. Staminate cymules 10- to 12-flowered, the flowers pedicellate, the pedicels about 2 mm. long; calyx shallowly 2-lobed, the lobes serrulate; pollen irregularly spheroid, with 3 pores, the exine granular to coarsely punctate. Mature fruit and seed not seen.

BRAZIL: PARANA: Jaguariahyva, in campo, Oct. 25, *Dusén 10440* (MO, S); Villa Velha, Jan. 25, *Dusén 9143* (S); in campo limpo, Oct. 11, *Dusén 13179* (G, GH, S); in campo, 740 m., *Jonsson 294a* (A).

16. STILLINGIA ZELAYENSIS (HBK.) Muell. Arg. in Linnaea 32:87. 1863.

Sapium zelayense HBK. Nov. Gen. et Spec. 2:51. 1817. (T.: *Humboldt & Bonpland s. n.*).

Erect to spreading subshrubs 5–15 dm. tall; stems subherbaceous, arising from a perennial, woody, underground base, terete, older parts hollow, woody, the secondary branches opposite or fascicled, solid or with a small pith, without lenticels,

green- to reddish-brown. Leaves petiolate, membranaceous, elliptic to oblanceolate to spathulate, 2.8–12.5 cm. long, 1.2–4.0 cm. wide, apex acute to acuminate, base acute, usually with 2 cyathiform glands, the margin serrulate, narrowly callose, the midrib and secondary venation prominent; petiole 1–9 mm. long. Inflorescence 5.0–16.0 cm. long, pedunculate and somewhat thickened below the lowest pistillate cymule, the upper staminate and lower pistillate cymules spiral, distinctly separate upon the peduncle, the pistillate cymules distant, the staminate crowded; bracts of the pistillate and staminate cymules broadly elliptic, mucronulate, serrulate, the glands patelliform, sessile. Sepals of pistillate flower 3, narrowly elliptic, about 3 mm. long, mucronulate, serrulate; ovary sessile, 3-carpellate; styles about 3 mm. long. Staminate cymules 3- to 5-flowered, the flowers sessile, about 3 mm. long; calyx deeply 2-lobed, the lobes serrulate; pollen spheroid, with 3 pores, the exine reticulate. Fruits shallowly 3-lobed, 0.6–1.8 cm. wide, the lobes of the gynobase 3–9 mm. long; seeds nearly spheroid, about 5.5–6.5 mm. long, 5.5–7.0 mm. wide, testa smooth, shiny, flattened at the micropylar end, the basal end rounded to slightly flattened, the caruncle small.

Pine woods and barrancas, rocky hills, shady open slopes on edges of cultivated areas, from about 1200 to 2800 m. altitude. Flowering mostly from about the last of March through the last of August, but occasionally in January and in October, and fruiting from June through October and occasionally in January.

MEXICO: CHIAPAS: Hacienda Monserrate, *Purpus 9174* (F, GH, MO, NY, UC, US), *9323* (UC); without locality, *Purpus s. n.* (US); pine and oak forest, Fenix (Chiapas?), *Purpus 10334* (NY). DISTRITO FEDERAL: east of Transfiguración, *Russell & Souviron 205* (US). JALISCO: Santa Cruz, *M. E. Jones 22* (MO, US); Rio Blanco, *E. Palmer 73* (NY, US); near Guadalajara, *Pringle s. n.* (C, F, LIL). MEXICO: Dist. Temascáltepec, Penon, *Hinton 4409* (GH); Dist. Temascáltepec, Temascáltepec, *Hinton 1127* (F, GH, NY, US). MORELOS: rocky hill near El Mirador, road from Cuernavaca to Mexico, *Williams 3814* (GH); Valle del Tepeite, *Lyonnet 988* (US); barranco near Cuernavaca, *Pringle 7244* (GH); pine woods about Cuernavaca, *Pringle 6886* (BR, F, GH, MO, NY, UC, US). MICHOACAN: vic. of Morelia, *Arsène 6679* (MO, US); vic. of Morelia, *Arsène 5236* (GH, MO, US); Tancitaro region, above Acahuaato, Munic. Apatzingan, *Leavenworth & Hoogstraal 1821* (F, GH); hills near Tepitenga, between Tolura and Morelia, *Gregg 727* (MO). PUEBLA: Cerro Tepoxuchil, près Puebla, *Nicolas s. n.* (LIL, NY); vic. of Puebla, Cerro Tepoxuchil, *Arsène 1400* (GH, MO, US); Rancho Losada, vic. of Puebla, *Arsène & Nicolas 282* (F). SAN LUIS POTOSÍ: 22° n. lat., alt. 6000–8000 ft., *Parry & Palmer 823* (GH, MO, US). TLAXCALA: Huamantla, alt. 8500 ft., *Balls B.5640* (A). STATE AND LOCALITY UNKNOWN: *Pavon s. n.* (G, photos in F, GH).

GUATEMALA: GUATEMALA: without locality, *Aguilar 93* (F). QUICHE: without locality, *Aguilar 1314* (F). SANTA ROSA: Zamorora, *Heyde & Lux 4579* (US); without locality, *Deam 6074* (F, GH, MICH, MO, NY, US).

PANAMÁ: CHIRIQUÍ: Boquete Distr., savannah, alt. 4000 ft., *Davidson 750* (A, P, MO, US).

The type specimen of *Stillingia zelayensis,* collected by Humboldt & Bonpland, was labelled for locality "prope Zelaya". The actual locality is Celaya, Guanajuato, Mexico.

Fig. 13. *Stillingia zelayensis.*

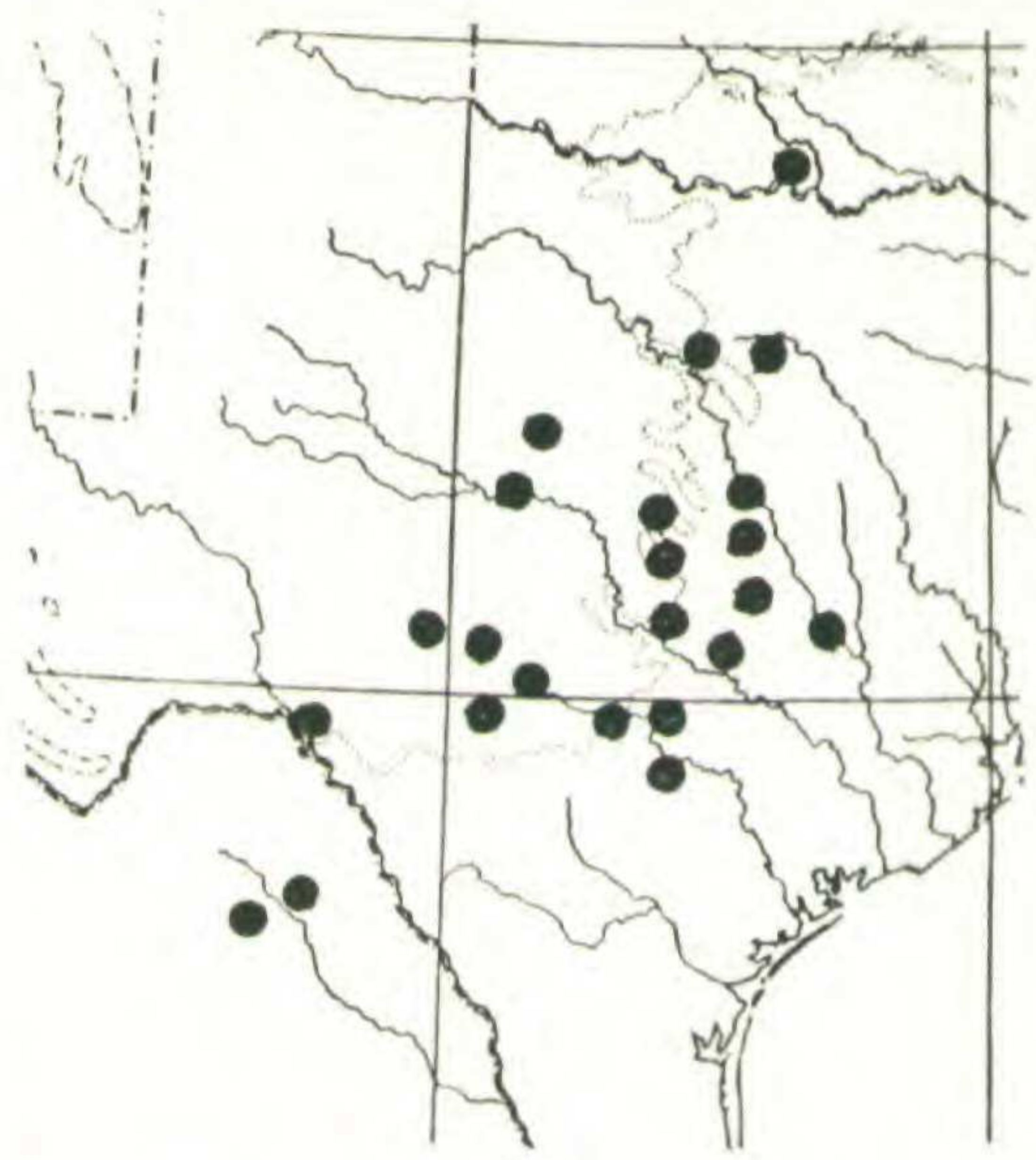

Fig. 14. *Stillingia texana.*

17. STILLINGIA TEXANA I. M. Johnston, in Contr. Gray Herb. n. s. 68:91. 1923.

Sapium sylvaticum var. *linearifolium* Torr. in Emory, Rept. U. S. & Mex. Bound. Surv. 2:201. 1859. (T.: *Schott s. n.!*).
Stillingia sylvatica δ. *linearifolia* (Torr.) Muell. Arg. in DC. Prodr. 15^2:1158. 1866.
Stillingia angustifolia (Muell Arg.) Engelm. ex S. Wats. in Proc. Am. Acad. 18:154. 1883, as to specimen cited, not as to basinym.
Stillingia linearifolia (Torr.) Small, Fl. S. E. United States, 704. 1903; not S. Wats. in Proc. Am. Acad. 14:297. 1879.
Stillingia texana var. *typica* Waterfall, in Rhodora 50:95. 1948.
Stillingia texana var. *latifolia* Waterfall, loc. cit. 1948. (T.: *Waterfall 6523!*).

Loose erect subshrubs, 2.5–6.0 dm. tall; roots fibriform; stems herbaceous, arising from an enlarged woody root crown, terete or slightly striate, unbranched, or, if branched, the branches fascicled near the apex of the main axis, without lenticels, light green or brown. Leaves alternate, sessile, membranaceous, linear to slightly lanceolate, 1–7 cm. long, 0.3–1.0 cm. wide, apex acute, base narrowly obtuse, without cyathiform glands, serrulate to crenulate, the midrib prominent, slightly decurrent. Inflorescence 3.0–8.0 cm. long, sessile below the lowest pistillate cymule, the upper staminate and lower pistillate cymules spiral, not distinctly separated on the peduncle; bracts of pistillate and staminate cymules narrowly elliptic, mucronulate, sharply denticulate, the patelliform glands sessile. Sepals of pistillate flower 3, elliptic, serrulate; ovary sessile, 3-carpellate; styles about 3 mm. long. Staminate cymules 3- to 5-flowered, the flowers subsessile, about 2.5 mm. long; calyx deeply 2-lobed, the lobes slightly serrulate; pollen mostly spheroid, with 3 pores, the exine granular to reticulate. Fruits shallowly 3-lobed, 4–6 mm. wide, the lobes of the gynobase 2–3 mm. long; seeds mostly ellipsoid, 3–5 mm. long, 2.5–4.0 mm. wide, testa slightly rugulose, with a very slight depression at the micropylar end, the base truncate, the caruncle small.

On limestone soils, mostly in open prairie lands, occasionally on loamy black soils, in rolling country. Flowers from about the last of April through the middle of July, and fruits from the first of June through September.

UNITED STATES: OKLAHOMA: Murray Co. TEXAS: Bell, Bexar, Bosque, Burnet, Comal, Conche, Erath, Fort Bend, Gillespie, Hays, Kendal, Kerr, Lampasas, Mills, Nolan; Parker, Real, Schackelford, Tarrant, Taylor, Travis, Washington, Williamson, Wilson, and Valverde counties.

MEXICO: COAHUILA: Munic. de Muzquiz, near Puerto Santa Ana, *Wynd & Mueller 225* (GH, MO, NY, US); Hacienda San Rafael, along the Sabinas River, *Wynd 705* (MO, NY, US); Muzquiz, *Marsh 80* (F, TEX); Muzquiz, Yerda Spring, *Marsh 291* (TEX).

One specimen was collected by *C. Wright* in New Mexico, without locality.

Although Watson gave a description for S. *angustifolia* Engelm., he placed S. *sylvatica* var. *angustifolia* in synonymy. It seems best to follow Johnston's interpretation (in Contr. Gray Herb. n. s. 68:91. 1923), that Watson was making a new combination and the name must apply to the Florida plant (Mueller's type) not, as was done for many years, to the Texan plant. Since no other name was available, Johnston renamed the species, basing it upon var. *linearifolia* Torr.

18. STILLINGIA SYLVATICA Garden, ex L. Mant. 19. 1767. (T.: *Garden s. n.*).

Erect or semi-erect subshrubs 2–12 dm. tall; roots fusiform; stems herbaceous to subherbaceous, arising singly or several together from a woody rhizome, terete, unbranched, or, if branched, the secondary branches dichotomous, approximate or fascicled near the apex of the main axis, without lenticels, bark of older parts frequently with transverse and longitudinal cracks, red to reddish-brown or mottled gray and reddish-brown. Leaves alternate, sessile or petiolate, membranaceous, green or sometimes bright red, narrowly elliptic, elliptic, obovate, spathulate or oblanceolate, 2–12 cm. long, 0.3–4.8 cm. wide, apex acute, rounded or emarginate, base narrowly acute to narrowly obtuse, without cyathiform glands, serrulate to crenulate, the midrib prominent, secondary venation obscure; petiole when present 0.1–0.8 cm. long. Inflorescence 2.5–13.0 cm. long, slender or stout, sessile below the lowest pistillate cymule, the upper staminate and lower pistillate cymules spiral, not distinctly separate upon the peduncle; bracts of the pistillate cymule caudate-acuminate to broadly elliptic, serrulate, mucronulate, the staminate broadly elliptic, mucronulate, the glands patelliform or cyathiform, sessile; peduncle and bracts red or yellow-green. Sepals of pistillate flower 3, elliptic, slightly cuspidate, serrulate, 2–3 mm. long; ovary sessile, 3-carpellate; styles about 2–5 mm. long. Staminate cymules 5- to 13-flowered, the flowers subsessile, about 1.5–2 mm. long; calyx shallowly 2-lobed, the lobes entire to slightly serrulate; pollen ellipsoid to spheroid, with 3 pores, the exine reticulate to granular. Fruit shallowly 3-lobed, 0.6–1.2 cm. wide, the lobes of the gynobase 3–6 mm. long; seed ellipsoid 4–8 mm. long, 3–7 mm. wide, testa rugose, the micropylar end flattened, the base rounded, mottled dark gray, the caruncle large, waxy.

18a. STILLINGIA SYLVATICA Garden ssp. SYLVATICA.

Stillingia sylvatica var. *salicifolia* Torr. in Ann. Lyc. N. Y. 2:245. 1826. (T.: *James s. n.!*).
Stillingia salicifolia (Torr.) Raf. in Atl. Jour. 1:146. 1832.
Stillingia lanceolata Nutt. in Trans. Am. Phil. Soc. n. s. 5:176. 1837. (T.: *Pitcher s. n.!*).
Stillingia sylvatica α. *spathulata* Muell. Arg. in DC. Prodr. 15²:1158. 1866. (T.: *Bosc s.n.*).
Stillingia sylvatica β. *genuina* Muell. Arg. loc. cit. 1866.
Stillingia sylvatica γ. *angustifolia* Muell. Arg. loc. cit. 1866. (T.: *Mitchell s. n.*),

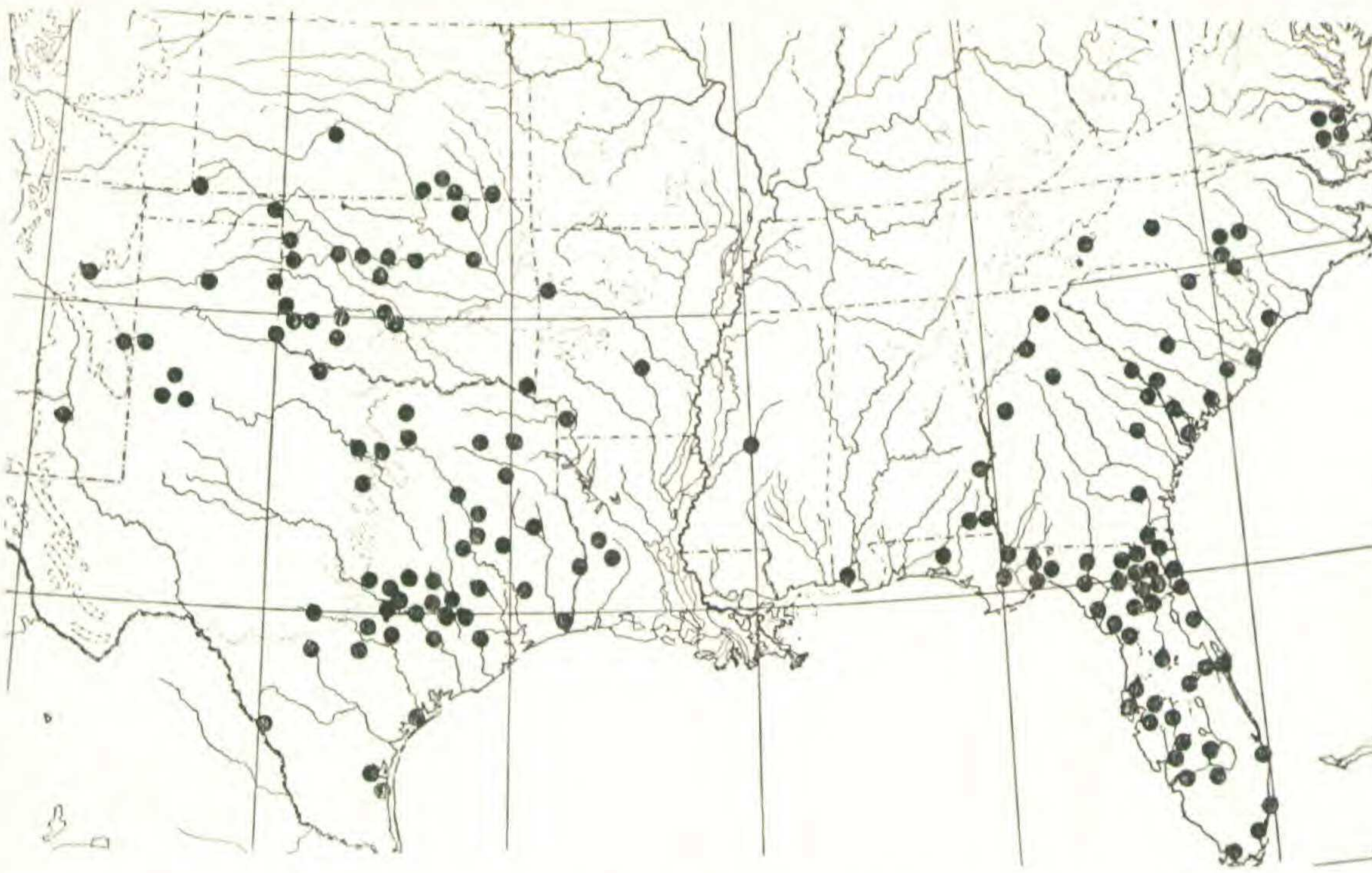

Fig. 15. *Stillingia sylvatica.*

Stillingia angustifolia (Muell. Arg.) Engelm. ex S. Wats. in Proc. Am. Acad. 18:154, 1883, as to basinym, not as to specimen cited.
Stillingia spathulata (Muell. Arg.) Small, Fl. S. E. United States, 704. 1903.
Stillingia salicifolia Small, loc. cit. 1903 (no type cited), non *S. salicifolia* (Torr.) Raf.
Stillingia Smallii Wooton & Standley, in Contr. U. S. Nat. Herb. 19:405. 1915. (Based on the preceding).

Leaves elliptic, spathulate or obovate, 3.2–11.5 cm. long, 0.3–4.8 cm. wide, apex acute, rounded or emarginate. Bracts of the pistillate cymule elliptic.

Coastal plain, except extreme southeastern Florida, well-drained sands, in open pine woods and sometimes on limestone, occasionally on roadsides and railroad banks. Flowers from March through June and fruits from April through September.

UNITED STATES: VIRGINIA: Isle of Wight, Nansemond, Sussex, and Southampton counties. NORTH CAROLINA: Buncombe, Harnett, Iredell, Moore, Richmond, and Scotland counties. SOUTH CAROLINA: Aiken, Beaufort, Berkeley, Charleston, Clarendon, Georgetown, Hampton, Horry, and Lancaster counties. GEORGIA: Bullock, Columbia, Gwinnett, Habersham, Jasper, Macon, Meriwether, Richmond, and Wayne counties. FLORIDA: Alachua, Baker, Bradford, Brevard, Broward, Charlotte, Citrus, Clay, Columbia, Dade, DeSoto, Dixie, Duval, Flagler, Gadsden, Gilchrist, Hardee, Hendry, Hernando, Highlands, Hillsborough, Jefferson, Lafayette, Lake, Lee, Leon, Levy, Liberty, Manatee, Marion, Monroe, Nassau, Orange, Palm Beach, Pasco, Pinellas, Polk, Putnam, St. John's, Sumter, Suwanee, Walton, Wakulla, Union, and Volusia counties. ALABAMA: Dale, Henry, Lee, and Mobile counties. LOUISIANA: Natchitoches, and Rapides parishes. MISSISSIPPI: Holmes Co. TEXAS: Anderson, Angelina, Aransas, Austin, Bailey, Bastrop, Bexar, Brazos, Caldwell, Childress, Dallas, Denton, DeWitt, Dimmit, Erath, Fayette, Fort Bend, Goliad, Gonzales, Gregg, Guadalupe, Hardin, Hemphill, Houston, Hutchinson, Jackson, Jefferson, Kendall, Kenedy, Lamb, Lee, Leon, Lubbock, Medina, Montgomery, Nacogdoches, Newton, Nueces, Parker, Tarrant, Terry, Travis, Upshur, Walker, Waller, Washington, Wichita, Wilson,

and Wood counties. ARKANSAS: Crawford, Jefferson, and Miller counties. KANSAS: Cowley, Harper, Montgomery, Morton, Sedgwick, and Stafford counties. OKLAHOMA: Beaver, Beckham, Blaine, Caddo, Comanche, Cleveland, Ellis, Greer, Kingfisher, Kiowa, Logan, McClain, McCurtain, Muskogee, Oklahoma, Osage, Payne, and Roger Mills counties. NEW MEXICO: Chaves, Harding, and Roosevelt counties.

The taxonomic confusion concerning S. *sylvatica* has resulted in part from the lack of knowledge of habitat and in part from a failure to recognize that some of the variability possibly is due to hybridization. The narrow-leaved specimens from Arkansas, Oklahoma, Texas and New Mexico, to which the epithets S. *sylvatica* var. *salicifolia* or S. *salicifolia* previously have been applied, is thought to be due to the influence of hybridization with S. *texana,* and as a result no nomenclatural status has been given them. The typical subspecies is largely confined to sandy areas within the coastal plain of the southern United States. It occurs only on limestone as a result of its putative hybridization with S. *texana,* and its occurrence on limestone soils is rather infrequent. *Stillingia sylvatica* ssp. *tenuis,* on the other hand, has become a stable entity on the limestone outcrops of extreme southeastern Florida.

Hybridization of S. *sylvatica* ssp. *sylvatica* with S. *aquatica* has been discussed under the heading of Subgeneric Categories. The following specimens of S. *sylvatica* in the herbarium of the Missouri Botanical Garden demonstrate the influence of introgressive hybridization with S. *aquatica.*

UNITED STATES: FLORIDA: OSCEOLA COUNTY: 5 mi. s.w. of Kissimee, dry sandy pineland, *Rogers 4.* HIGHLANDS COUNTY: n. of Highland, Hammock State Park, dry sands, *Rogers 5;* ½ mi. e. of Sebring, sandy flats, cleared field, *Rogers 6;* 2–3 mi. s.e. of Sebring, near shallow, marshy pond, *Rogers 7.* PALM BEACH COUNTY: 15 mi. s.w. of Lake Worth, sands near cypress swamp, *Rogers 14-1, 14-3.* MARTIN COUNTY: 1 mi. s. of Stuart, 100–200 yards from cypress pond, on a low sandy ridge, *Rogers 15-1, 15-2, 15-3, 15-5, 15-7, 15-10, 15-11.* (See also specimen citations of S. *aquatica* showing introgression with S. *sylvatica,* p. 230.)

The medicinal values of S. *sylvatica* have been explored and reported in several journals. An alcohol or water extract of the root was, and occasionally still is, used by physicians and laymen in South Carolina particularly, in the treatment of syphilis, in cutaneous diseases, chronic hepatic infections and in the composition of diet drinks.[23]. As late as 1944[24], this plant was mentioned as of minor drug importance, particularly as a sialagogue and expectorant.

Vernacular names: Queen's Delight, Queen's Root, Silverleaf, Nettle Potato, Yaw-root, Marcory, and Cockup-hat.

18b. STILLINGIA SYLVATICA Garden, ex L. ssp. **tenuis** (Small) D. J. Rogers, stat. nov.

Stillingia tenuis Small in Bull. N. Y. Bot. Gard. 3:429. 1905. (T.: *Small & Wilson 1580!*).

Leaves very narrowly elliptic to linear, 2–10 cm. long, 0.3–1.0 cm. wide, apex acute. Bracts of the pistillate cymule caudate-acuminate.

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[23]Millspaugh, C. F. Medicinal Plants 1:151. 1892.

[24]Allport, Noel L. The Chemistry and Pharmacy of Vegetable Drugs, p. 235, *Tab. XVII.* 1944.

Fig. 16. *Stillingia sylvatica* ssp. *tenuis*.

Confined to the extreme southeastern coast of Florida, usually growing only where limestone outcrops occur at the surface, with none or only a very slight amount of sandy soil mantle. Flowers from January to May or June, and fruits from March through June.

UNITED STATES: FLORIDA: Dade Co.

The subspecies occupies a distinct geographical and ecological region from its closest relative S. *sylvatica* ssp. *sylvatica,* but it has not sufficiently diverged to make it a separate species. This is perhaps due to the fact either that there is little possibility of further migration, it being limited to a very narrow strip on the southeast coast of Florida, or that insufficient time has elapsed since its formation. This part of Florida is one of the most recently exposed land masses on this continent.

Subgen. II. GYMNOSTILLINGIA (Muell. Arg.) D. J. Rogers, stat. nov.

Gymnostillingia Muell. Arg. in Linnaea 32:89. 1863, as genus.

Series 4. ACUTIFOLIAE D. J. Rogers, ser. nov.

§ *Gymnostillingia* (Muell. Arg.) Pax & Hoffm. in Engl. Pflanzenr. IV. Fam. 147. V:193, 1912.

Frutices aut arbores parvi; sepala floris pistillati minuta vel inchoata; flores staminales in cymula solitaria, polline sphaeroideo vel ellipsoideo; semina ecaruncu-lata. Mexico australi et Guatemalae.

19. STILLINGIA ACUTIFOLIA (Benth.) Benth. ex Hemsl. Biol. Centr.-Amer. Bot. 3:135. 1883.

Sapium acutifolium Benth. Pl. Hartweg. 90. 1842. (T.: *Hartweg 614!*).
Gymnostillingia acutifolia (Benth.) Muell. Arg. in Linnaea 32:89. 1863.
Gymnostillingia macrantha Muell. Arg. loc. cit. 1863. (T.: *Pavon s. n.*).
Stillingia macrantha (Muell. Arg.) Benth. ex Hemsl. Biol. Centr.-Amer. Bot. 3:135. 1883.
Stillingia propria Brandg. in Univ. Cal. Publ. Bot. 6:185. 1915. (T.: *Purpus 7343!*).

Compact shrubs or small trees 1–7 m. tall; trunk to 12.5 cm. diameter below the lowest branches, the branches alternate to fascicled, terete below, angled above, the older branches sparsely lenticellate, the sap milky. Leaves alternate, petiolate, thinly membranaceous, dark green above, paler beneath, ovate, lanceolate, or elliptic, 2.8–15.0 cm. long, 1.0–4.3 cm. broad, acuminate, base acute, without cyathiform glands, the midrib and secondary venation prominent; petiole 2–5 mm. long. Inflorescence 2.5–4.2 cm. long, sessile below the lowest pistillate cymule, the upper staminate and lower pistillate cymules spiral, crowded, not distinctly separate upon the peduncle; bracts of the pistillate and staminate cymules elliptic, cuspidate, about 1.5 mm. long, the glands patelliform, sessile. Sepals of the pis-tillate flower 3, minute or rudimentary; ovary sessile, 3-carpellate; styles about 2 mm. long. Staminate flowers solitary, very shortly pedicellate, about 2 mm. long, the calyx lobes entire; pollen ellipsoid to spheroid, triangular in cross-section with

3 pores, the exine finely punctate. Fruit 3–4 mm. wide, deeply 3-lobed, the lobes of the gynobase 1.5–2.0 mm. long; seeds about 3.5 mm. long, 2.5–3.0 mm. wide, with a slight depression on each side of the raphe at micropylar end, the base rounded, the testa smooth, the caruncle absent.

Mountainous regions of Chiapas and Guatemala in damp wooded regions, open banks, barrancas in pine forests, white sand slopes, at altitudes from 1400 to 3000 m. Flowers from late June to the first of September, and fruits from the first of August to the last of December.

MEXICO: CHIAPAS: Cerro del Boqueron, *Purpus 7343* (F, GH, MO, NY); Siltepec, *Matuda 1683* (A, MICH, NY).

GUATEMALA: CHIMALTENANGO: Volcan Acatenango, *Kellerman 6576* (F); Chichavac, *Skutch 29* (US), *554* (A); west of Patzun, *Williams & Molina 11844* (F, MO); Alameda, *J. R. Johnston 951* (F, NY); near Rio Pixcayo, between Chimaltenango and San Martin Jilotepeque, *Standley 64330* (F); Barranco de La Sierra, southeast of Patzun, *Standley 61510* (A, F, NY); near Parramos, *Standley 59879* (A), *59880* (F); region of Los Positos, above Las Calderas, region of Las Calderas, *Standley 57803* (A, F), *60018* (F), *80138* (A). GUATEMALA: *Ruano 1256* (F); *Aguilar 220* (F). HUEHUETENANGO: Todos Santos, *Melhus & Goodman 3617* (F); San Juan Atitlan, *Skutch 1165* (A, F, US). JALAPA: between Jalapa and Montana Miramundo, *Steyermark 32895* (F). QUEZALTENANGO: Aguas Calientes, *Seler 2741* (A, GH, NY, US); Cumbre de Tuilacan, s. w. of San Martin Chile Verde, *Standley 67787* (F); region of Boxantin, s. e. of San Martin Chile Verde, *Standley 83827* (F). SACATEPEQUEZ: along Rio Guacalate, on road between Antigua and Chimaltenango, *Standley 81010* (F). SAN MARCOS: mountains along the road between San Marcos and Serchil, *Standley 85327* (F); El Boqueron, near border of Dept. Quezaltenango, *Standley 66284* (F); El Boqueron, in the mountains at the summit of the road between San Antonio Sacatepequez and Palestina, *Standley 85280* (F); roadside, above Rio Tacana, near San Antonio, *Standley 66165* (F). SANTA ROSA: Santa Rosa, *Heyde & Lux 3473* (F, GH, NY, US). SOLOLA: Encuentros, *L. O. Williams 13150* (F); Los Encuentros, *Seler 2381* (GH, US). TOTONICAPAN: along road between San Francisco El Alto and Momostenango, *Standley 84033* (F). AZCATEPEQUE: *Bernoulli & Cairo 2499* (K, S). Dept. unknown, Hacienda de Argueta, *Hartweg 614* (F, K).

According to information from a labeled specimen, the acrid milky sap of *S. acutifolia* is used as a caustic in the treatment of sores and boils.

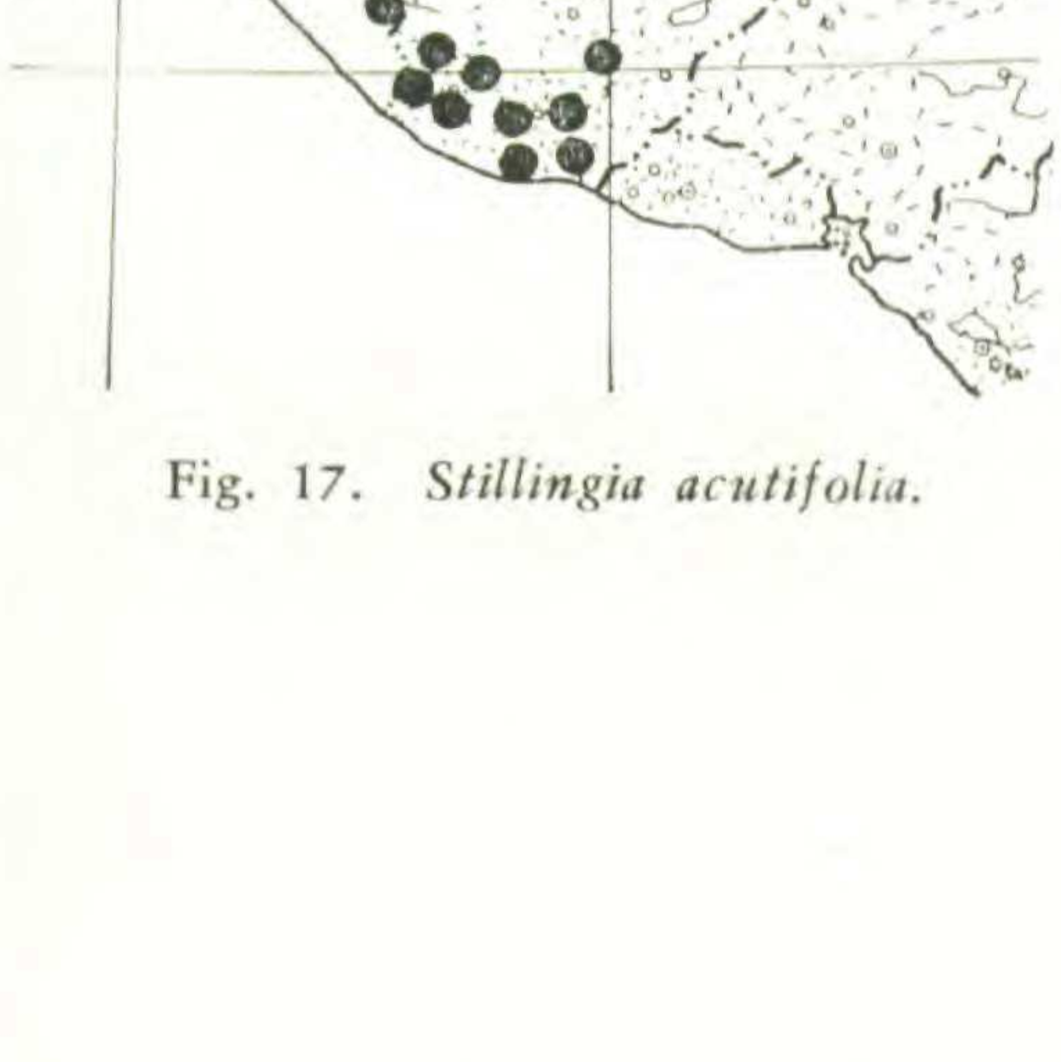

Fig. 17. *Stillingia acutifolia.*

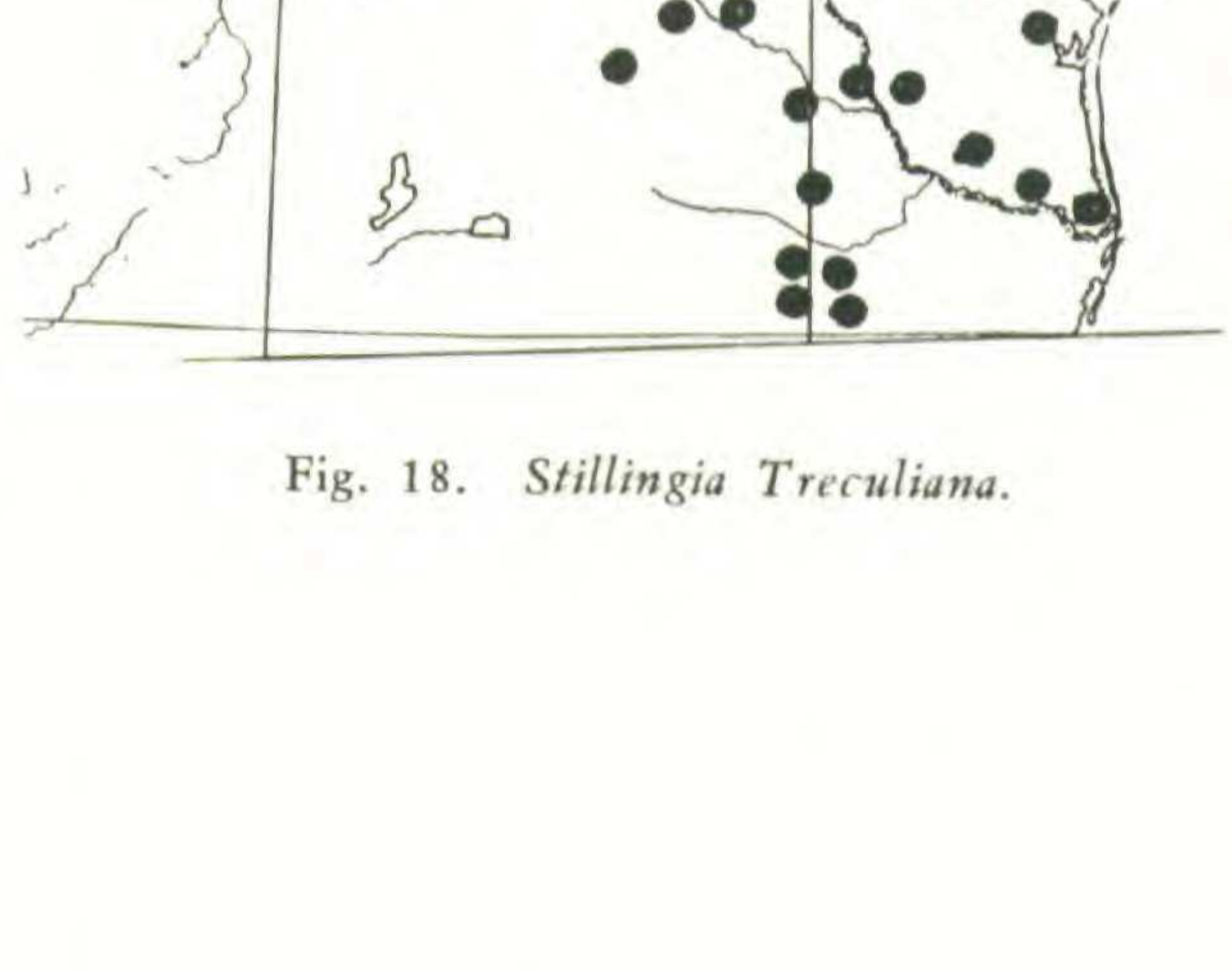

Fig. 18. *Stillingia Treculiana.*

Series 5. TRECULIANAE D. J. Rogers, ser. nov.

§ *Leptostachyae* Pax & Hoffm. in Engl. Pflanzenr. IV. Fam. 147. V:194. 1912.
§ *Gymnostillingia* Wats. in Pax & Hoffm., loc. cit. 1912, in synonymy.

Herbae perennes; flores pistillati sine sepalis (*S. Treculiana* excepta sepalis minutis et fagaceis); flores staminales in cymula solitaria, polline sphaeroideo segmentis 3 foraminibus 3; semina aut ecarunculata aut carunculis minutis et fugaceis.

KEY TO THE SPECIES

A. Caruncle present; glands of pistillate bracts nearly sessile.
  B. Leaves obovate-spathulate, rounded or broadly acute, coarsely incised-dentate; sepals minute, fugacious; styles about 1 mm. long...... 20. *S. Treculiana*
  BB. Leaves linear, acuminate or acute, sparsely setulose-denticulate; sepals absent; styles about 4 mm. long...... 21. *S. paucidentata*
AA. Caruncle absent; glands of pistillate bracts long-pedicellate.
  C. Leaves elliptic-spathulate, apex acuminate, finely callose-dentate, conspicuously 3-costate; stems striate...... 22. *S. spinulosa*
  CC. Leaves linear, apex acute, entire or sparsely denticulate, venation not prominent; stems terete...... 23. *S. linearifolia*

20. STILLINGIA TRECULIANA (Muell. Arg.) I. M. Johnston, in Contr. Gray Herb. n. s. 67:91. 1923.

Sapium annuum var. *dentatum* Torr. in Emory, Rept. U. S. & Mex. Bound. Surv. 2:201, 1859. (T.: *Bigelow s. n.!*).
Gymnanthes Treculiana Muell. Arg. in Linnaea 34:216. 1865. (T.: *Trecul 1458!*).
Sebastiania Treculiana (Muell. Arg.) Muell. Arg. in DC. Prodr. 15^2:1160. 1866.
Stillingia Torreyana S. Wats. in Proc. Am. Acad. 14:298. 1879. (Based on *Sapium annuum* var. *dentatum* Torr.).
Stillingia dentata (Torr.) Britt. & Rusby, in Trans. N. Y. Acad. 7:14. 1887.

Spreading perennial herbs 1.0–4.5 dm. tall; elongate tap root woody; fascicled branches arising from the ground level, striate, green. Leaves alternate, sessile, membranaceous, obovate-spathulate, 1.0–3.8 cm. long, 0.6–1.5 cm. wide, apex rounded to broadly acute, base narrowly cuneate, without cyathiform glands, coarsely incised-dentate, the midvein prominent, secondary venation obscure. Inflorescence 2.5–7.0 cm. long, pedunculate below the lowest pistillate cymule, the upper staminate and lower pistillate cymules spiral, crowded, not distinctly separate upon the peduncle; bracts of the pistillate and staminate cymules elliptic or cuneate, concave, with 1–3 mucros, the patelliform glands nearly sessile. Pistillate flowers solitary, sepals minute, fugacious; ovary sessile, 3-carpellate; styles about 1 mm. long. Staminate flowers solitary, subsessile, about 1.5 mm. long; calyx deeply 2-lobed, the margins involute, entire; pollen spheroid, deeply 3-segmented, with 3 pores, the exine coarsely punctate. Fruit deeply 3-lobed, the lobes of the gynobase 0.8–1.0 mm. long; seeds about 2.5 mm. long, 1.5–2.0 mm. wide, with a slight depression on each side of the raphe at the micropylar end, the base rounded, the testa smooth or slightly rugulose, the caruncle present.

Sandy soils with limestone base, gravel, on hills, mesas, grasslands, along railroads and roadsides in southwestern Texas and northeastern Mexico. Flowers from the last of February to the first of June, and fruits from the last of March through the first of August.

United States: texas: Bexar, Cameron, Concho, Crockett, Presidio, Star, Tom Green, Val Verde, and Webb counties.

Mexico: coahuila: Allende, *Marsh 1768* (F); Muzquiz, *Marsh 1116* (F); Cuatro Cienegas, *Shreve 8454* (UC); Sabinas, *M. E. Jones 29115* (MO, UC). nuevo leon: Mesas, Garcia, *Pringle 2504* (F, GH, MO, NY, UC, US); 100 kilo. s. of Nuevo Laredo, on road to Monterrey, *Frye & Frye 2375* (GH, MO, NY, US); near Santa Catarina, *Alonis, Johnson & Barkley 15189M* (F, GH, MO, TEX); 23 mi. n. of Sabinas Hidalgo, *Barkley & Webster 14497* (MO, TEX, UC); canyon 12 mi. w. of Monterrey, *Barkley & Painter 14253* (GH, MO, TEX); 10 mi. w. of Monterrey, *Shreve & Tinkham 9572* (GH); Rancho Resendez, Lampazos, *Edwards 389* (F, MO, TEX, UC); Monterrey, *E. Palmer 1258* (GH, US). tamaulipas: San Miguel, *Pringle 2071* (F). Mexico orientali ad Rio Bravo del Norte, *Trecul 1458* (MO, P).

There has been some confusion as to whether S. *Treculiana* is an annual or perennial. This confusion arose from the original description of *Sapium annuum* var. *dentatum* made by Torrey. He could easily have called this plant an annual since the specimen used as a type was a small fragment, without roots. Mueller, however, definitely states in his description of *Gymnanthes Treculiana* that this is a perennial species. Examination of material from several herbaria amply corroborates his observation.

Vernacular name: Yerba del Sapo (Mexico).

21. Stillingia paucidentata S. Wats. in Proc. Am. Acad. 14:298. 1879. (T.: *E. Palmer 517!*).

Stillingia linearifolia var. *paucidentata* (S. Wats.) Jepson, Fl. Cal. 2^1:422. 1936.

Compact, erect perennial herbs 2.5–3.5 dm. tall; elongate tap root woody; the fascicled branches arising from ground level, secondary branches alternate to approximate. Leaves alternate to approximate, sessile, crowded, membranaceous, linear, 2–4 cm. long, 0.1–0.3 cm. wide, acuminate or acute, not narrowed at the base, without cyathiform glands, sparsely setulose-denticulate to entire, the mid-vein prominent, decurrent, secondary venation obscure. Inflorescence 2.3–7.0 cm. long, usually sessile below the lowest pistillate cymule, the upper staminate and lower pistillate cymules spiral, crowded, not distinctly separate upon the peduncle; bracts of the pistillate and staminate cymules elliptic or cuneate, mucronulate, the patelliform glands short-pedicellate (less than 1 mm.). Pistillate flowers solitary; sepals absent; ovary sessile, 3-carpellate; styles about 4 mm. long. Staminate flowers solitary, subsessile, about 1.5 mm. long; calyx shallowly 2-lobed, the lobes slightly serrulate; pollen spheroid, shallowly 3-segmented, with 3 pores, the exine coarsely punctate. Fruit deeply 3-lobed, the lobes of the gynobase 1.5–2.0 mm. long; seeds about 3 mm. long, 2 mm. wide, testa smooth, the caruncle small.

In sandy washes, plains, bare arid hills and gravel, up to 4000 ft. altitude. Flowers from the first of April through the end of May, and fruits about the first of May through the middle of June.

United States: california: Kern, Los Angeles, and San Bernardino counties.

Fig. 19. *Stillingia paucidentata.*

Fig. 20. *Stillingia spinulosa.*

22. STILLINGIA SPINULOSA Torr. in Emory, Notes Milit. Rec. 151. 1848. (T.: *Emory s. n.!*).

Sapium annuum Torr. in Emory, Rept. U. S. & Mex. Bound. Surv. 2:201. 1859. (Based on *S. spinulosa*).
Stillingia annua (Torr.) Muell. Arg. in DC. Prodr. 15^2:1160. 1866.

Compact perennial herbs 0.5–2.0 dm. tall; elongate tap root woody, the fascicled branches arising from ground level, the secondary branches opposite or approximate. Leaves opposite or approximate, sessile, crowded, membranaceous, elliptic-spathulate, 1.5–4.0 cm. long, 0.5–1.7 cm. wide, apex acuminate, base narrowly cuneate, without cyathiform glands, finely callose-dentate, decurrent, prominently 3-costate. Inflorescence 1.2–2.0 cm. long, usually sessile below the lowest pistillate cymule, the upper staminate and lower pistillate cymules spiral, crowded, not distinctly separate upon the peduncle; bracts of pistillate and staminate cymules broadly elliptic, concave, cuspidate, somewhat 3-lobed, about 1 mm. long, the patelliform glands pedicellate, 1.5–2.0 mm. long. Pistillate flowers solitary, sepals absent; ovary sessile, 3-carpellate; styles about 3 mm. long. Staminate flowers solitary, subsessile, about 1.5 mm. long; calyx shallowly 2-lobed, the lobes entire; pollen ellipsoid, triangular in cross-section, with 3 pores, the exine finely to coarsely punctate. Fruit deeply 3-lobed, the lobes of the gynobase about 2 mm. long; seeds 3.0–3.5 mm. long, the testa smooth, sometimes mottled, the caruncle absent.

Sandy open desert. Flowers from late December to late March, and fruits from March to June.

UNITED STATES: ARIZONA: Yuma Co. CALIFORNIA: San Diego, Riverside, Imperial, and San Bernardino counties.

MEXICO: BAJA CALIFORNIA: mesa near Cerro Breto, Cucapa Mts., *MacDougal 206* (NY). SONORA: Colonia Lerdo, *MacDougal s. n.* (NY); Buena Mesa near Col. Riv., *MacDougal s. n.* (NY); Pimeria Alta, *Schott s. n.* (NY).

Torrey described *Stillingia spinulosa* in 1848, but changed the name in 1859 to *Sapium annuum*, using the same specimens. No explanation was given for this change.

23. STILLINGIA LINEARIFOLIA S. Wats. in Proc. Am. Acad. 14:297. 1879. (T.: *E. Palmer 449!*).

Stillingia gymnogyna Pax & Hoffm. in Engl. Pflanzenr. IV. Fam. 147. V:196. 1912. (Based on *S. linearifolia* S. Wats.).

Diffuse perennial herbs 1.5–9.0 dm. tall; elongate tap root woody, the fascicled branches arising from ground level, the secondary branches alternate, approximate, or fascicled. Leaves alternate or approximate, sessile, membranaceous, linear, 1.2–3.2 cm. long, 0.1–0.3 cm. wide, apex acute, the base narrowly acute, without cyathiform glands, entire or sparsely denticulate, shortly decurrent, the venation not prominent. Inflorescence 1.6–7.0 cm. long, sessile or shortly pedunculate below the lowest pistillate cymule, the upper staminate and lower pistillate cymules spiral, scattered, not distinctly separate upon the peduncle; bracts of the pistillate and staminate cymules rhombic or cuneate, mucronulate, flattened, about 1 mm. long, the cyathiform glands pedicellate, about 1 mm. long. Pistillate flowers solitary; sepals absent; ovary sessile, 3-carpellate; styles about 2 mm. long. Staminate flowers solitary, subsessile, about 1 mm. long; calyx shallowly 2-lobed, the lobes entire or slightly serrulate; pollen spheroid to irregularly ellipsoid, broadly triangular in cross-section, with 3 pores, the exine finely punctate. Fruit deeply 3-lobed, the lobes of the gynobase about 1 mm. long; seeds about 1.8–2.5 mm. long, 1.5–1.8 mm. wide; testa smooth, sometimes mottled, the caruncle absent.

Desert sands, lava rocks, chaparral, dry sandy washes, and sandy roadsides. Flowers from the first of March to the end of April, and fruits from the middle of March to the middle of June.

UNITED STATES: CALIFORNIA: Imperial, Los Angeles, Riverside, San Bernardino, and San Diego counties. NEVADA: Clark Co.

MEXICO: BAJA CALIFORNIA: sandy arroyo margin, San Augustin, *Gentry 4004* (GH, MO, UC); 11 km. s.e. of San Augustin on road to Catavina, *Carter, Alexander & Kellogg 1877* (MO); lagoon head, Guadaloupe Island, *E. Palmer 785* (F, GH, US); 37 mi. s. of Pozo Aleman, *Shreve 7018* (F, MICH, US); sandy plains, Calmalli, *Purpus 25* (F, US); Yecate, *Orcutt s. n.* (F, MO), Socorri, *Orcutt s. n.* (F, MO); coast near Ascension Island, *Brandegee s. n.* (UC); Cordon Grande, *Brandegee s. n.* (F, GH); lava rocks, San Quintin, *Epling & Stewart s. n.* (F, US); south slope 8 mi. from Rosario on road to El Marmol, *Wiggins 4337* (GH, US); sandy wash at junction of El Marmol and San Fernando roads, 25 mi. from El Marmol, *Wiggins 4354* (GH, MICH, NY, UC, US); sandy flats 32 mi. s. of Pozo Aleman, *Wiggins 7880* (F, MICH, NY, UC, US); sandy wash 11 mi. e. of San Ignacio, *Wiggins 7913* (F, MICH, NY, UC, US); along Rio Santo Domingo about 4 miles above the Mission, *Wiggins & Demaree 4778* (F, GH, MICH, NY, UC, US). SONORA: 30 mi. s. w. of Sonoyta on road to Punta Penasca, *Shreve 7591* (F, MICH, MO, US); llano 30 mi. from Sonoyta, *Wiggins 8359* (MICH, UC, US); 28 mi. s. of Sonoyta on road to Punta Penasco, *Keck 4183* (NY).

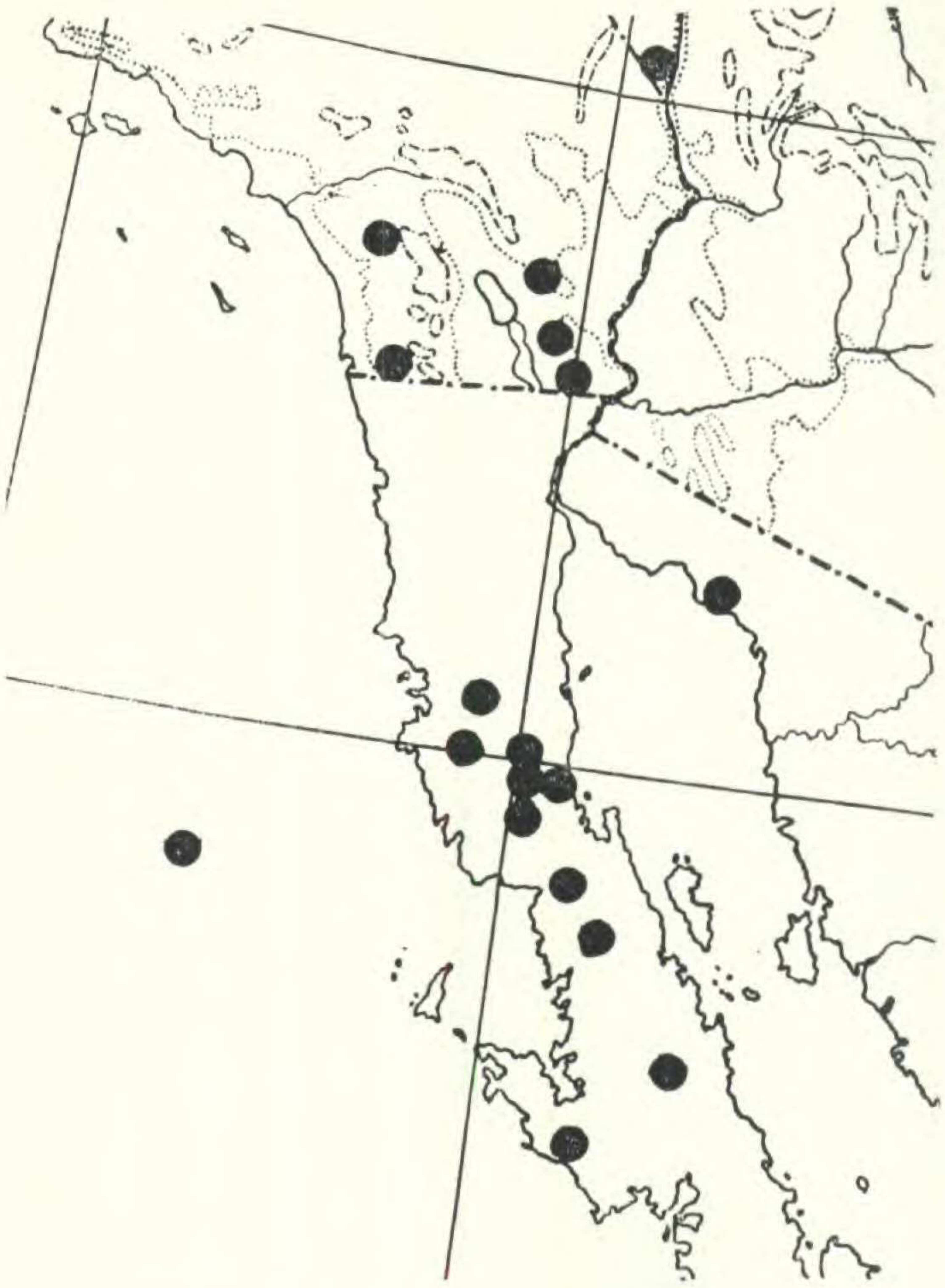

Fig. 21. *Stillingia linearifolia.*

DOUBTFUL SPECIES

Stillingia cruenta Standl. & Steyerm. in Field Mus. Publ. Bot. 23:125. 1944. (T.: *Standley 91207!*).

Without exception, the available specimens of this species are sterile. It will be impossible to assign the plant to a genus until flowering or fruiting specimens are available.

EXCLUDED SPECIES

In the following list, the species marked with an exclamation point (!) have been verified by examination either of the type specimen or of a photograph of the type, but those without an exclamation point are excluded only on the authority of Pax and Hoffmann in Engl. Pflanzenr. IV, Fam. 147, V:197. 1912. Only those species found in the Americas are considered here. Old World species have not been included. No reference is made to Baillon's 'Étud. Gén. Euphorb.' 1858, since Baillon rarely made formal transfers, although his taxonomy included many genera under *Stillingia.*

S. *appendiculata* Muell. Arg. in Linnaea 32:87. 1863 = SAPIUM APPENDICULATUM (Muell. Arg.) Pax & Hoffm. in Engl. Pflanzenr. IV, Fam. 147, V:214. 1912!

S. *arborea* Pav. ex Huber in synon. = SAPIUM PEDICELLATUM Huber, in Bull. Herb. Boiss. II, 6:352, *f. 9.* 1906.

S. arborescens Pittier, Contr. Fl. Venez. 9. 1921 = SEBASTIANIA GRANATENSIS (Muell. Arg.) Muell. Arg. in DC. Prodr. 15^2:1189. 1866! (*Gymnanthes granatensis* Muell. Arg. in Linnaea 32:107. 1863).

S. bahiensis (Muell. Arg.) Baill. in Adansonia 5:329. 1865 (*Gymnanthes bahiensis* Muell. Arg. in Linnaea 32:102. 1863) = SEBASTIANIA BAHIENSIS (Muell. Arg.) Muell. Arg. in DC. Prodr. 15^2:1183. 1866!

S. bidentata (Mart.) Baill. in Adansonia 5:324. 1865 (*Cnemidostachys bidentata* Mart. Nov. Gen. & Sp. 1:69, *t. 43*. 1824) = SEBASTIANIA BIDENTATA (Mart.) Pax in Engl. Pflanzenr. IV, Fam. 147, V:113. 1912.

S. biglandulosa (L.) Baill. in Adansonia 5:320. 1865 (*Hippomane biglandulosa* L. Sp. Pl. ed. 2, 1431. 1763) = SAPIUM HIPPOMANE G. F. W. Mey. Prim. Fl. Essequeb. 275. 1818.

S. brasiliensis (Spreng.) Baill. in Adansonia 5:328. 1865 = SEBASTIANIA BRASILIENSIS Spreng. Neue Entdeck. 2:118, *t. 3*. 1821.

S. brevifolia (Kl. ex Muell. Arg.) Baill. in Adansonia 5:328. 1865 (*Gymnanthes brevifolia* Kl. ex Muell. Arg. in Linnaea 32:104. 1863) = SEBASTIANIA BREVIFOLIA (Kl. ex Muell. Arg.) Muell. Arg. in DC. Prodr. 15^2:1186. 1866.

S. Commersoniana Baill. in Adansonia 5:330. 1865 = SEBASTIANIA KLOTZSCHIANA (Muell. Arg.) Muell. Arg. in DC. Prodr. 15^2:1178. 1866 (*Gymnanthes Klotzschiana* Muell. Arg. in Linnaea 32:98. 1863).

S. concolor (Spreng.) Baill. in Adansonia 5:327. 1865 (*Gussonia concolor* Spreng. Neue Entdeck. 2:120, *t. 2*. 1821) = ACTINOSTEMON CONCOLOR (Spreng.) Muell. Arg. var. κ. GENUINUS Muell. Arg. in Mart. Fl. Bras. 11^2:595, *t. 595, f. II*. 1874.

S. coriacea (Mart.) Baill. in Adansonia 5:323. 1865 (*Cnemidostachys coriacea* Mart. Nov. Gen. & Sp. 1:71. 1824) = SEBASTIANIA MARGINATA (Mart.) Muell. Arg. in DC. Prodr. 15^2:1166. 1866.

S. corniculata (Vahl) Baill. Étud. Gén. Euph. Atlas, *pl. 8, fig. 1–12*. 1858 (*Tragia corniculata* Vahl, Eclog. Amer. 2:55, *t. 19*. 1789) = SEBASTIANIA CORNICULATA (Vahl) Pax in Engl. Pflanzenr. IV, Fam. 147, V:96. 1912, SEBASTIANIA GLANDULOSA (Mart.) Pax, loc. cit. 100. 1912, SEBASTIANIA HISPIDA (Mart.) Pax, loc. cit. 105. 1912.

S. cremostachya Baill. in Adansonia 5:322. 1865 = SAPIUM KLOTZSCHIANUM (Muell. Arg.) Huber, in Bull. Herb. Boiss. II, 6:438, *f. 30*. 1906 (*Sapium biglandulosum* var. ε. *Klotzschianum* Muell. Arg. in Linnaea 32:117. 1863).

S. daphniphylla Baill. in Adansonia 5:326. 1865 = SEBASTIANIA DAPHNIPHYLLA (Baill.) Muell. Arg. in DC. Prodr. 15^2:1180. 1866.

S. discolor (Spreng.) Baill. in Adansonia 5:327. 1865 (*Gussonia discolor* Spreng. Neue Entdeck. 2:119, *t. 2, f. 7–10*. 1821) = SEBASTIANIA DISCOLOR (Spreng.) Muell. in DC. Prodr. 15^2:1185. 1866!

S. divaricata Kl. ex Pax & Hoffm. in synon. in Engl. Pflanzenr. IV, Fam. 147, V:230. 1912 = SAPIUM MORITZIANUM Kl. in Seem. Bot. Voy. Herald, 100. 1852.

S. dracunculoides Baill. in Adansonia 5:321. 1865 = EXCOECARIA BIGLANDULOSA var. ρ. DRACUNCULOIDES (Baill.) Muell. Arg. in DC. Prodr. 15^2:1207. 1866.

S. eglandulosa Rich. in Sagra, Hist. Fis. Cuba 11:202. 1850 = GRIMMEODENDRON EGLANDULOSUM (Rich.) Urb. Symb. Antill. 5:398. 1908!

S. frutescens Bosc. ex Steud. Nomencl. Bot. 1:815. 1821 = SEBASTIANIA FRUTICOSA (Bartr.) Fern. in Rhodora 46:45. 1944.

S. fruticosa Michx. ex Spreng. Syst. 3:805. 1826 = SEBASTIANIA FRUTICOSA (Bartr.) Fern. in Rhodora 46:45. 1944.

S. Gaudichaudii (Muell. Arg.) Baill. in Adansonia 5:332. 1865 = SEBASTIANIA GAUDICHAUDII (Muell. Arg.) Muell. Arg. in DC. Prodr. 15^2:1177. 1866!

S. glabrata (Mart.) Baill. Étud. Gén. Euphorb. Atl. 17, *pl. 8, figs 13–16*. 1858 (*Cnemidostachys glabrata* Mart. Nov. Gen. & Sp. 1:70. 1824) = SEBASTIANIA MULTIRAMEA (Kl.) Muell. Arg. var. β. GLABRATA (Mart.) Pax in Engl. Pflanzenr. IV, Fam. 147, V:120. 1912!

S. glandulosa Dombey ex Juss. in Ann. Sci. Nat. Bot. 25:24. 1832 = ADENOPELTIS COLLIGUAYA Bert. ex Juss. loc. cit. 1832.

S. *guianensis* (Aubl.) Baill. in Adansonia 5:332. 1865 = MAPROUNEA GUIANENSIS Aubl. Hist. Pl. Guian. 2:895, *t. 342*. 1775.

S. *haematantha* Standl. in Ann. Mo. Bot. Gard. 27:314. 1940 = SAPIUM MORITZIANUM Kl. in Seem. Bot. Voy. Herald, 100. 1852!

S. *hastata* Kl. ex Baill. in Adansonia 5:324. 1865 = SEBASTIANIA DITASSOIDES (Didrichs.) Muell. Arg. var. β. GLABRATA Muell. Arg. in DC, Prodr, 15^2:1174, 1866!

S. *heterodoxa* Muell. Arg. in Linnaea 32:89. 1863 = SEBASTIANIA HETERODOXA (Muell. Arg.) Benth. in Benth. & Hook. f. Gen. Pl. 3:334. 1880!

S. *Hilariana* Baill. in Adansonia 5:332. 1865 = MAPROUNEA BRASILIENSIS St. Hil. Pl. Usuel. Bresil, *t. 65*. 1824–1828.

S. *hypoleuca* (Benth.) Baill. in Adansonia 5:330. 1865 = GYMNANTHES HYPOLEUCA Benth. in Hook. Jour. Bot. 6:325. 1854!

S. *jacobinensis* (Muell. Arg.) Baill. in Adansonia 5:329. 1865 = SEBASTIANIA JACOBINENSIS (Muell. Arg.) Muell. Arg. in DC. Prodr. 15^2:1188. 1866.

S. *laureola* Baill. in Adansonia 5:327. 1865 = SEBASTIANIA LAUREOLA (Baill.) Muell. Arg. in DC. Prodr. 15^2:1180. 1866.

S. *laurifolia* Rich. in Sagra, Hist. Fis. Cuba 11:201, *pl. 69*. 1850 = SAPIUM JAMAICENSE Swartz, Adnot. Bot. 62. 1829.

S. *ligustrina* Michx. Fl. Bor. Amer. 2:213. 1803 = SEBASTIANIA FRUTICOSA (Bartr.) Fern. in Rhodora 46:45. 1944.

S. *marginata* (Muell. Arg.) Baill. in Adansonia 5:321. 1865 = SAPIUM MARGINATUM var. α. LANCEOLATUM Muell. Arg. in Linnaea 32:120. 1863!

S. *multiramea* (Kl.) Baill. in Adansonia 5:325. 1865 (*Sarothrostachys multiramea* Kl. in Wiegm. (Erichs.) Arch. 7:185. 1841) = SEBASTIANIA MULTIRAMEA (Kl.) Muell. Arg. var. β. GLABRATA (Baill.) Pax in Engl. Pflanzenr. IV, Fam. 147, V:120. 1912!

S. *myrtilloides* (Mart.) Baill. in Adansonia 5:323. 1865 (*Cnemidostachys myrtilloides* Mart. Nov. Gen. & Sp. 1:67, *t. 40*. 1824) = SEBASTIANIA MYRTILLOIDES (Mart.) Pax in Engl. Pflanzenr. IV, Fam. 147, V:93. 1912, SEBASTIANIA OLEOIDES (Mart.) Muell. Arg. in Mart. Fl. Bras. 11^2:548. 1874!

S. *nervosa* (Muell. Arg.) Baill. in Adansonia 5:328. 1865 (*Gymnanthes nervosa* Muell. Arg. in Linnaea 32:102. 1863) = SEBASTIANIA NERVOSA (Muell. Arg.) Muell. Arg. in DC. Prodr. 15^2:1183. 1866!

S. *obovata* (Kl. ex Muell. Arg.) Baill. in Adansonia 5:321. 1865 = SAPIUM OBOVATUM Kl. ex Muell. Arg. in Linnaea 32:120. 1863.

S. *pachystachya* (Kl.) Baill. in Adansonia 5:330. 1865 (*Adenogyne pachystachys* Kl. in Wiegm. (Erichs.) Arch. 7:184. 1841) = SEBASTIANIA PACHYSTACHYS (Kl.) Muell. Arg. in DC. Prodr. 15^2:1182. 1866!

S. *patagonica* (Spegazz.) Pax & Hoffm. in Engl. Pflanzenr. IV, Fam. 147, V:188. 1912 (*Colliguaya patagonica* Spegazz. in Revist. Facult. Agron. y Veter. La Plata 3:572. 1907) = SAPIUM **patagonicum** (Spegazz.) D. J. Rogers, comb. nov.

This species has very few affinities with any other known species of *Sapium*, *Stillingia* or *Colliguaya*. However, the absence of a gynobase, the axillary inflorescence, the structure of the staminate flower, the shape of the glands at the base of the leaf blade all point to characters of *Sapium*, not *Stillingia*. In one character, the texture of the seed coat, this species shows no affinities with the American species of *Sapium*. All of the new world species of *Sapium* have an arillate seed coat, but S. *patagonicum* has a firm, hardened testa, without evidence of an aril.

S. *phyllanthiformis* Baill. in Adansonia 5:331. 1865 = SEBASTIANIA SCHOTTIANA Muell. Arg. var. β. PHYLLANTHIFORMIS (Baill.) Pax & Hoffm. in Engl. Pflanzenr. IV, Fam. 147, V:127. 1912.

S. *prostrata* (Mart.) Baill. in Adansonia 5:324. 1865 (*Cnemidostachys prostrata* Mart. Nov. Gen. & Sp. 1:70. 1824) = SEBASTIANIA CORNICULATA (Vahl) Pax, var. ν. PROSTRATA (Mart.) Muell. Arg. in DC. Prodr. 15^2:1172. 1866!, SEBASTIANIA GLANDULOSA (Mart.) Pax, in Engl. Pflanzenr. IV, Fam. 147, V:100. 1912, and SEBASTIANIA HISPIDA (Mart.) Pax, loc. cit. 105. 1912.

S. *pteroclada* (Muell. Arg.) Baill. in Adansonia 5:329. 1865 (*Gymnanthes pteroclada* Muell. Arg. in Linnaea 32:107. 1863) = SEBASTIANIA PTEROCLADA (Muell. Arg.) Muell. Arg. in DC. Prodr. 15^2:1190. 1866!

S. *ramosissima* (St. Hil.) Baill. in Adansonia 5:328. 1865 (*Microstachys ramosissima* St. Hil. Hist. Pl. Remarq. Bresil. 242. 1824) = SEBASTIANIA BRASILIENSIS Spreng. Neue Entdeck. 2:118, *t. 3.* 1821.

S. *rigida* (Muell. Arg.) Baill. in Adansonia 5:330. 1865 (*Gymnanthes rigida* Muell. Arg. in Linnaea 32:99. 1863) = SEBASTIANIA RIGIDA (Muell. Arg.) Muell. Arg. in DC. Prodr. 15^2:1180. 1866.

S. *rufescens* Moritz ex Pax & Hoffm. in synon. in Engl. Pflanzenr. IV, Fam. 147, V:212. 1912 = SAPIUM STYLARE Muell. Arg. in Linnaea 32:119. 1863.

S. *salicifolia* Kl. ex Baill. in Adansonia 5:320. 1865 = SAPIUM HAEMATOSPERMUM Muell. Arg. in Linnaea 34:217. 1865.

S. *Schottiana* (Muell. Arg.) Baill. in Adansonia 5:331. 1865 (*Gymnanthes Schottiana* Muell. Arg. in Linnaea 32:96. 1863) = SEBASTIANIA SCHOTTIANA (Muell. Arg.) Muell. Arg. in DC. Prodr. 15^2:1176. 1866!

S. *sebifera* (L.) Michx. Fl. Bor. Amer. 2:213. 1803 (*Croton sebiferum* L. Sp. Pl. ed. 1, 1004. 1753) = SAPIUM SEBIFERUM (L.) Roxb. Fl. Ind. 3:693. 1832.

S. *serrata* Kl. ex Baill. in Adansonia 5:329. 1865 = SEBASTIANIA SERRATA (Kl. ex Baill.) Muell. Arg. in Mart. Fl. Bras. 11^2:576. 1874.

S. *serrulata* (Mart.) Baill. in Adansonia 5:324. 1865 (*Cnemidostachys serrulata* Mart. Nov. Gen. & Sp. 1:68, *t. 42.* 1824 = SEBASTIANIA SERRULATA (Mart.) Muell. Arg. var. α. KLOTZSCHIANA Muell. Arg. in DC. Prodr. 15^2:1167. 1866!

S. *stipulacea* (Kl. ex Muell. Arg.) Baill. in Adansonia 5:325. 1865 (*Gymnanthes stipulacea* Kl. ex Muell. Arg. in Linnaea 32:96. 1863) = SEBASTIANIA STIPULACEA (Kl. ex Muell. Arg.) Muell. Arg. in DC. Prodr. 15^2:1176. 1866!

S. *sylvatica* Garden var. *paraguayensis* Morong, in Ann. N. Y. Acad. 7:226. 1893 = SAPIUM HAEMATOSPERMUM Muell. Arg. in Linnaea 34:217. 1865!

S. *trinervia* (Muell. Arg.) Baill. in Adansonia 5:328. 1865 (*Gymnanthes trinervia* Muell. Arg. in Linnaea 32:101. 1863) = SEBASTIANIA TRINERVIA (Muell. Arg.) Muell. Arg. in DC. Prodr. 15^2:1182. 1866!

S. *Weddelliana* Baill. in Adansonia 5:329. 1865 = SEBASTIANIA WEDDELLIANA (Baill.) Muell. Arg. in DC. Prodr. 15^2:1188. 1866.

S. *Widgreni* (Muell. Arg.) Baill. in Adansonia 5:326. 1865 (*Gymnanthes Widgreni* Muell. Arg. in Linnaea 32:97. 1863) = SEBASTIANIA WIDGRENI (Muell. Arg.) Muell. Arg. in DC. Prodr. 15^2:1178. 1866.

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